

CTO

THE MAGAZINE FOR INFORMATION

OCTOBER 1, 1997

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IN TWO SECTIONS

CALL CENTERS:

Are Your Customers Sitting On Hold?

PAGE 40

PLUS

Managing
Bandwidth
Growth

PAGE 56

Doug Patterson's
center handles
80 million calls
annually

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COVER STORY: CALL CENTERS The once-humble call center is taking on strategic importance with the convergence of help desk, telesales and customer service operations. IT executives are forging the necessary connections. *By Jim Nash*

56 Planning to Beat the Band

NETWORK INFRASTRUCTURE Robust applications may bring ease of use and multimedia to every desktop, but if bandwidth demands escalate, a whole system can clunk to a halt. *By Peter Fabris*

70 Minding the Stores

EFFICIENT CONSUMER RESPONSE How do grocery retailers keep customers happy while stamping out waste and inefficiency? Depends where they are. In the United States and the United Kingdom, the answer can be very different. Efficient consumer response may—or may not—be a part. *By Malcolm Wheatley*

ON THE COVER:

“Part of the way we have built this company is by maximizing our call center operations.”

—Doug Patterson, executive vice president of telecommunications and call center operations at HFS Inc.

Cover photo by Edward Santalone



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FORRESTER VIEW Internet channels will overwhelm call centers unprepared for the rising tide of incoming e-mail, voice and even video communications.

By David Cooperstein

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EMERGING TECHNOLOGY Continuous data streams could make networks cheaper and stronger. *By Fred Hapgood*

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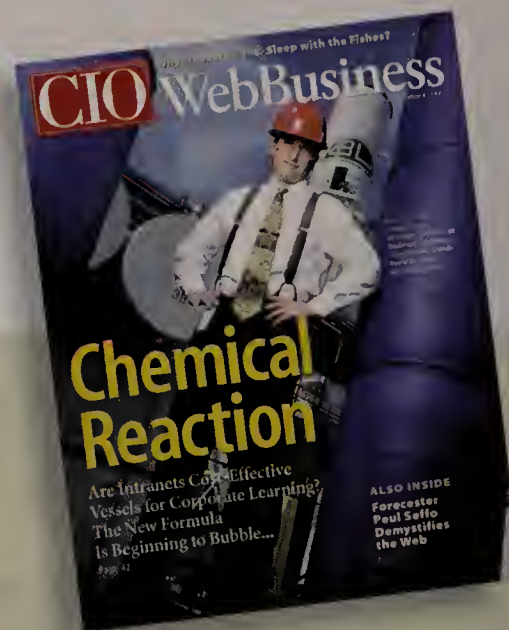
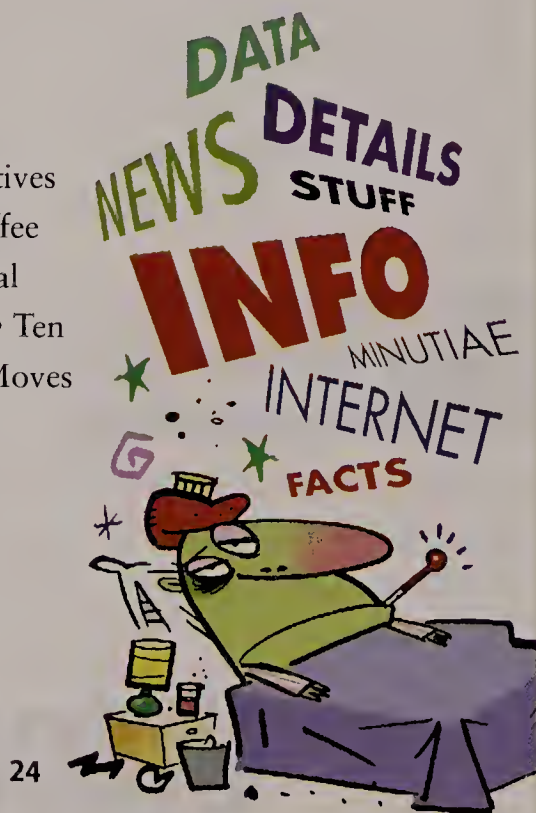
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COVER STORY: CORPORATE

LEARNING Imagine a classroom where the learning never ends, and students are never late.

BUSINESS MODELS Last May, Nets Inc. filed for bankruptcy protection. What went wrong?

INTERVIEW: PAUL SAFFO To know what the future holds, examine the past and apply it to the present.

CUSTOMER INTERFACE As the Web evolves to something with real business value, we revisit some fundamentals.

GRAY MATTERS Two perspectives on policies that govern Internet use at work.

THE MAIN ATTRACTION The most effective Web sites offer users a conversation, not a monologue.

POWER SOURCE Every intranet project starts somewhere, and the best ones never end.

BY REDESIGN AT&T's intranet.



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In Box

LETTER FROM THE EDITOR AND HOW TO REACH US

Notice something different about *CIO* this month? It now comes in two separately bound sections. Beginning with this issue, *CIO* subscribers will get more relevant, critical information than ever about using technology to business advantage.

On the first of the month, you'll receive *CIO Web Business*, which will help you and your business peers use the Web to improve productivity, increase profits and transform your business. With your mid-month issue, you'll get *CIO Enterprise*, which is pitched toward helping senior decision makers from all functions better understand how to derive value from their information technology investments.

These two sections have strong, healthy roots. Four years ago, a small group of us held a day-long off-site meeting to discuss the growing need for non-IS executives to better understand technology. We presented to Joe Levy, president and group publisher of CIO Communications Inc., a proposal for a new publication to serve that market. While the market was not yet ready, the seed of this idea lived on to become *CIO Enterprise*. You'll receive your first copy in two weeks.

Those of you familiar with *CIO*'s sister publication, *WebMaster*, have already figured out the lineage of *CIO Web Business*. For two years, *WebMaster* has been reporting from the front lines of the Web frontier. There's been no better source of business-critical information about the Internet, intranets and extranets. That legacy will continue with *CIO Web Business*. With a few exceptions, *CIO Web Business* will be produced by the same outstanding journalists who brought you *WebMaster* and will contain many of the same features and columns that made that magazine one of the most relevant in its field.

I'm pretty sure producing a magazine in two sections is a publishing-industry first. You'll notice something else that's unique: the "routing slip" that forms a partial cover wrap. Encouraging readers to pass along both of these new sections serves two purposes. First and foremost, we've taken to heart your request for tools to help educate your bosses and peers about the value—and the complexity—of using information technology as a central part of the business, so the sections serve as an aid to the CIO. We also believe that the "other Os" themselves are increasingly hungry for this type of information. With our 10 years of experience bridging the gap between business and technology, we believe no publishing organization is better suited to meet that need.

Let us know what you think of these sections by dropping an e-mail to letters@cio.com. And pass it along!


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KEEPING CIO FINE-TUNED AND IN STEP with continually evolving reader needs requires the advice and guidance of people who are not only readers but who are in the vanguard of change in this profession. We are indebted to the following individuals for their generous time and insight in the past year and their continuing guidance into 1998.

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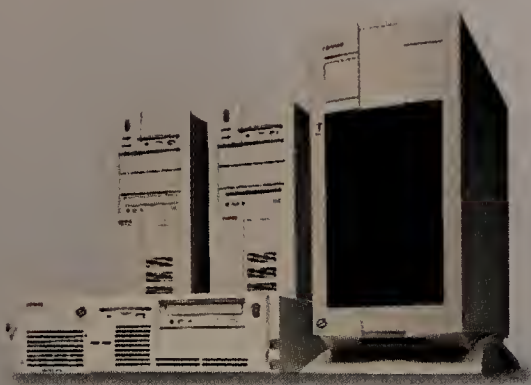


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Publisher's Note

No one envies the ballplayer who must get up at bat after a grand slam hit, the performer following the comedian who left the audience in stitches, or the soloist standing center stage immediately after the lively production number that brought down the house. Simply put, some acts are harder to follow than others.



It is, however, an even greater challenge to be in a situation where you must follow your own show-stopping performance. That is precisely the situation we put ourselves in at *CIO* when we created our biggest, best and possibly most memorable issue to date: the Sept. 15, 1997, Tenth Anniversary *CIO*. Now that our "intermission" is over, you—the leaders of the information age—are standing by with even greater expectations, waiting for more.

I'm pleased to say that "more" is exactly what you are going to get. As

we kick off our second decade of delivering IT trends, best practices and business solutions, we debut our new editorial concept: *CIO* magazine in two sections. With this inaugural October 1 issue, you are receiving *CIO*'s traditional collection of IT case studies, lessons learned and strategic solutions in *CIO* section 1 as well as insightful information about using the Internet for business profit, Web initiatives and other related issues in section 2: *CIO Web Business*.

As a *CIO* reader, you are adept at conducting ongoing evaluations, adopting new practices, making continuous improvements and fine-tuning your corporate strategy. At *CIO*, we are adapting to the changing demands of your profession and adopting a new method of delivering the information you and your executive partners need to excel in business in the 21st century.

I hope you find our new format beneficial in achieving your personal and professional objectives. Please share your comments by writing to jlevy@cio.com.

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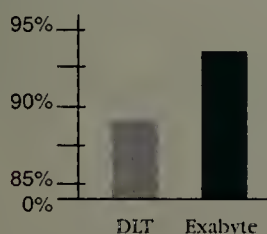
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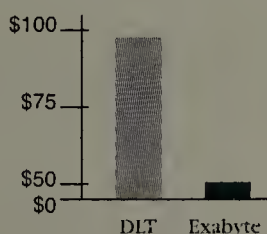
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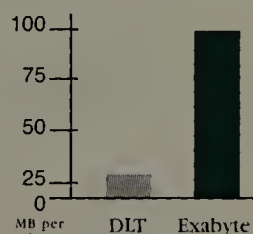
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Trendlines

NEWS, INSIGHT, HUMOR, REVIEWS

Edited by Katherine Auer

Face Value

FACE RECOGNITION Helen of Troy's face may have launched a thousand ships, but could it cash a check? Were she alive today, even the legendary beauty would need a checking account to do so—until recently, that is. Now, thanks to a new use of face recognition technology, even those of us not so generously endowed—either with beauty or with checking accounts—can use our mugs to cash checks.

Miros Inc.'s TrueFace has been integrated with Mr. Payroll Corp.'s automated check cashing machines to allow registered consumers without checking accounts to get cash. The first machines were put in use in May at an Express Mart in Fort Worth, Texas, a Hansom Hanks store in Arlington, Texas, and at a Toot 'n Tum store in Amarillo, Texas.

Customers using Mr. Payroll's sys-

tems first indicate their choice of language and enter their social security number, then say "cheese!" for the cameras in the ATM. Using pattern recognition, TrueFace checks each customer's face against a previously enrolled image in a database of Mr. Payroll customers at the company's Fort Worth headquarters. Within seconds, valid customers' checks are approved.

TrueFace uses neural network technology and focuses on features from every part of the face to determine the similarity between two facial images. Using either two cameras or two views of each live face presentation, TrueFace provides a stereo view that can easily distinguish between a two-dimensional picture and a three-dimensional real face. "Using TrueFace, we can quickly and unobtrusively verify the



identity of each customer wishing to cash a check," says Michael Stinson, president of Mr. Payroll. "The biometric security provided by TrueFace also allows Mr. Payroll to guarantee 100 percent of every check cashed." ■

The Data Detectives

COMPUTER EVIDENCE RECOVERY When there's been a computer-related crime, who you gonna call? Because computer evidence is becoming more critical in corporate lawsuits, the answer, fortunately, isn't "Ghostbusters." A few real-

life companies have carved out a specialized niche in computer evidence recovery. Frequently, the data they recover can make the difference between winning and losing in court.

Data recovery gumshoes from Ontrack Data

International Inc. have helped their corporate and law firm clients win a number of tricky law suits:

- Workers at one company were accused of using sexually explicit games and screen savers on their office PCs. After they were confronted with the accusation, they deleted the offensive material from their hard drives and claimed it was never there. Ontrack analyzed the hard drives and found tell-tale files indicating that the racy software had indeed once been loaded onto the computers. As a result, a female employee prevailed in a suit against the company.
- Similarly, in an embezzlement case, Ontrack detectives found that an employee had deleted files after being ordered by a court not to do so.
- Ontrack helped thwart a software piracy ring formed by a client's employees, who were using the company's Internet server to hawk illegal copies of well-known software such as Adobe Systems Inc.'s PageMaker and Borland International





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Trendlines

Inc.'s Delphi Developer.

With vital evidence for corporate lawsuits now commonly stored within disk drives and servers, many legal discovery processes—the pretrial investigations conducted by both parties in a case—require electronic detective work, says Rick Moher, a computer evidence consultant for Ontrack in Eden Prairie, Minn. Because it takes only a few mouse clicks or key strokes to delete computer files, data recovery services are becoming vital to the legal profession.

Ontrack's legal data recovery business began to grow substantially two years ago, according to CEO Michael Rogers. Since then, "we have worked with hundreds of civil and corporate lawyers, as well as corporate IS managers, for whom electronic documents were critical to the outcome of their cases." Ontrack has electronically gumshoed for lawyers in more than 40 countries as well.

The data recovery field is also spawning new players. Jon Berryhill, for example, who learned his trade with the U.S. Air Force, launched Berryhill Computer Forensics in Benicia, Calif., in May 1997. Berryhill predicts the field will continue to attract new entrepreneurs.

—Peter Fabris

Learning by Example

CIO EDUCATION When it comes to learning something well, reading about theory and hearing abstract discussions can take you only so far. Just about any successful educator will tell you that a critical part of absorbing and understanding a new topic is seeing the real thing firsthand. So it is with the education of CIOs.

At South Korea's Samsung Corp., this idea is not only widely recognized, it has been put into action. To keep its IS executives on the cutting edge when it comes to using information technology strategically, the company has implemented a program to send them to the United States so they can see how American firms use IT in strategic initiatives. Last year, Samsung invested \$500,000 in a custom program at the State University of New York at Buffalo's School of Management. Between November 1996 and June 1997, three groups of Samsung IS execs, 75 altogether, took part in the program.

Samsung is Korea's largest "chaebol," or conglomerate, and its 39 subsidiaries are some of the country's more IT-sophisticated companies. As a result, there are few local opportunities to observe and exchange business strategy ideas—particularly those that can help the firm maintain its global competitive edge. "Samsung is a global company, but it

must become more culturally attuned," says Carl Pegels, professor of management science and systems at the university and the program's organizer.

Each session lasts about a month and incorporates site visits to U.S. firms, day-long lectures and speeches

from invited guests such as IT economics guru and former Xerox Corp. CIO Paul Strassmann. Topics covered include emerging technologies, electronic commerce and IT security. In addition, while not actually in the course plan, eating at American watering holes and observing U.S. life might also be classified as part of the much sought-after cultural exchange.

The CIO's job is precarious in the United States, says lecturer Lawrence Sanders, a School of Management associate professor. "We give them ways to deal with the inherent risks of IT." At the same time, Samsung does not face the same issues that most U.S. companies face: Its subsidiaries have generally moved beyond legacy systems; consequently, they do not face the same year 2000 issues as their U.S. counterparts do, says Sanders. "We provide a North American perspective on technology," he says. What they can benefit from most is seeing U.S. companies in action, implementing IT.

In June, 23 Samsung CIOs and CIOs-to-be participating in the program visited Marine Midland Bank, Owens Corning, Xerox Corp. and KPMG Peat Marwick LLP to see how those companies employ IT. Marine Midland Bank is a subsidiary of one of Samsung's major overseas clients, and it recently used IT to expand electronic banking applications. Says trip participant Song Joong Kang, "We learn a lot about theory in Korea. We want to see IT applied."

—Alex Frankel



Coffee Servers

Caffeine, Sugar, Kona, Mochajava, Halfnhalf, Hypercaffeine, Bunn

Names of network servers at Midcoast Internet Solutions in Rockland, Maine. "Employees drink lots of coffee and get wound up all day," explains Jason Philbrook, the company's president.

SOURCE: CONCORD COMMUNICATIONS INC.



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Trendlines



A New Occupational Hazard

INFO OVERLOAD Everyone knows that information overload can make it harder to find what's important and to get things done. But what many don't know is that the effects of the problem can go much further than that. In fact, according to a recent study by Reuters Business Information entitled "Dying for Information," too much information can make you positively ill.

The disease is known as "information fatigue syndrome," and the Reuters study suggests it's far from uncommon. In a report on *CNN Worldview*, psychologist David Lewis, who wrote the foreword to the study, discussed the syndrome. "We're often seeing a failure of concentration. We're seeing a loss of motivation, loss of morale. We're seeing greater irri-

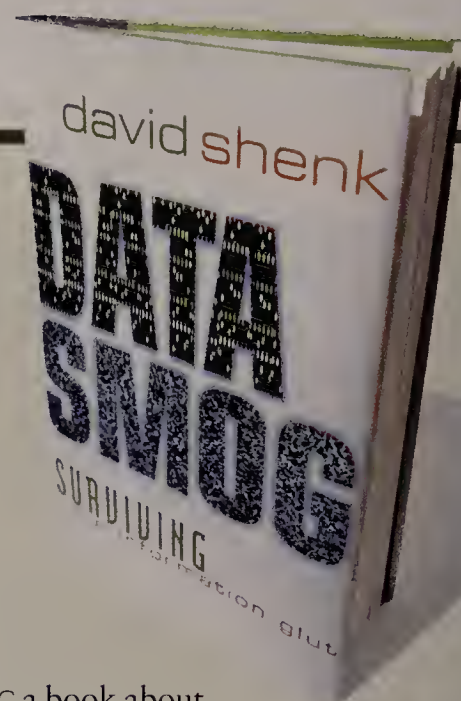
Off the Shelf

Words of Caution

Data Smog: Surviving the Information Glut

David Shenk

HarperEdge, 1997, \$24



THE INHERENT IRONY OF WRITING a book about information overload isn't lost on author David Shenk. In the course of his research for *Data Smog: Surviving the Information Glut*, Shenk compiled on his computer roughly 700 separate text files that consumed 70MB of memory. That fact shouldn't scare away time-pressed potential readers, though. Shenk has turned his voluminous research into an eminently readable 250-page cautionary book that offers abundant food for thought.

Most people who use computers, voice-mail, e-mail and cell phones are intimately familiar with information overload. Shenk, a self-confessed data junkie, is no exception. Using personal anecdotes (as well as those collected from several others), Shenk describes how too much data is debilitating and can often impede clarity. Take conflicting "expert" opinions on everything from the effects of caffeine to the impact of affirmative action. The result of sifting through such data is indecision, Shenk writes, as people always wait for the next study with "conclusive" results.

Instead of enhancing decision making and opening up dialogues, Shenk contends that the plethora of data actually has the opposite effect, thereby eroding the quality of our lives. For evidence, Shenk points to the prevalence of junk e-mail, pervasive advertising, shock radio and mindless television programs. He also has some choice words for the computer industry. By pushing hardware and software upgrades that are bloated with unnecessary bells and whistles, vendors propagate a seemingly endless technology learning curve. It's hardly surprising, Shenk writes, that people feel as if they're losing control. For IS managers, the ceaseless drive to upgrade results in an expensive and never-ending game of keeping up with the corporate Joneses, Shenk says.

While everyone from Al Gore to Newt Gingrich is celebrating the information age, Shenk's book reads like a voice from the wilderness. Like anything in excess, Shenk wants readers to believe that too much data is a bad and even dangerous thing, and most of his arguments are credible.

Although Shenk readily admits that there's no turning back the technology clock, there are ways to combat data glut. His survival tips are not earthshaking, but they are sound. For starters, he says, people need to exercise discipline. Just turn off the television, delete the frivolous e-mails and leave the cell phone at the office. Legislation can also play a role by limiting the often invasive reach of marketers. And above all, Shenk says, stop believing that the Internet will solve problems in education. Providing free access to data does not enhance knowledge; we must recognize that information without context and relevance will undermine education.

If you've ever felt overwhelmed by the amount of data in your life, *Data Smog* is worth reading. If nothing else, it explains why you're feeling stressed and lets you know that you are not alone.

—Megan Santosus

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For CIOs, it's time to re-examine data center strategies

Historically, CIOs at large corporations didn't have much of a choice to make when it came to hardware for their data center. The data center was the stable environment, and the platform most often put there to run mission-critical applications was a mainframe. The big question was which MVS-compatible system to purchase.

When the time came to expand the data center computing resource, it was usually accomplished with a forklift upgrade: Out went the old mainframe, in came a new one. Extending the data center was a relatively simple decision — albeit an expensive one.

The decisions today's CIOs face are anything but simple. It's no longer a case of simply saying, "Buy a mainframe," although that option may still be a tempting one, given the mainframe's history of reliability and uptime, worldwide service and support networks, huge redundant DASD farms, proven operating environments, and the full array of software solutions from transaction processing monitors to MRP applications.

Now, CIOs are also charged with transforming their organization's IT infrastructure into part of the solution to drive global competitive advantage. The profusion of options available to make this happen means there are a lot more choices to make, particularly when it comes to what goes inside today's data center — the heart of mission-critical computing. Their mission: Maintain the dependability of the traditional centralized environment while increasing the flexibility and agility of information to help the business succeed.

Distributed solutions move in

Since the "buy another mainframe" days, the centralized computing philosophy epitomized by the mainframe has given way to distributed architectures, many of them based on UNIX. Introduced in 1969, UNIX has since become a viable alternative to MVS-type environments for two key reasons. Its matured reliability and manageability have put it on par with mainframe operating environments. And, unlike more expensive proprietary architectures, the Intel microprocessors as scalable building blocks for high-performance systems, provide an affordable robust platform for the data center.

Decision makers controlling some of today's largest data centers have chosen Intel architecture (IA)-based servers running 8, 16, 32 or more Pentium® Pro processors and UNIX to handle huge transaction loads and databases. And, just to keep things interesting, Windows NT is making significant inroads into business-critical environments, further accelerating the price/performance sea change in corporate computing.

Just because faster-cheaper-better technology has arrived on the scene

Continued on p. 7

When it comes to selecting a data center solution, headroom is a key criteria.



ILLUSTRATIONS BY
CHRISTOPHER BING



For securities regulator NASD, true security lies in scalability



SEQUENT

The National Association of Securities Dealers (NASD) is the largest securities industry self-regulatory organization in the U.S., with 5,000 member firms, 58,000 branch offices and 500,000 registered representatives. The organization stores and manipulates daily data on the NASDAQ exchange and provides Web access to this information, including current stock quotations. For this, it needs a lot of processing power.

NASD had been deploying its broker databases and services on SMP systems. But when it realized that traditional SMP systems could not support enough storage, memory or computational horsepower for a new market data application it was rolling out, it began evaluating non-uniform memory access (NUMA) architecture systems.

NASD was interested in NUMA because the architecture is designed for scalability. NUMA allows servers to be easily added and linked within clusters. It also allows them to act as hot backups for each other.

For the processing-intensive tasks mentioned above, as well as managing a 1TB (and growing) data warehouse, NASD originally planned to purchase two NUMA systems. But in the end, it decided to buy only one: a Sequent Computer Systems NUMA-Q™ 2000 server.

The reason the company needed to buy only one was the scalability of the NUMA system. The server can scale to 252 200MHz Intel Pentium® Pro processors and possesses a nearly infinite capacity to

accommodate soaring disk storage.

NASD chose a system from Sequent. "The real benefit Sequent provides us is their high availability," says Sam Loughery, vice president, NASD production services. "You can fail one node over to another or have a Sequent node designated as a backup for certain applications." In addition, the organization had been a Sequent user for four years, and had migrated many of its legacy applications to the Sequent environment.

The NASD system is a two-node cluster system that supports up to 16 processors per node. But the ability to add Intel processors and meet growing storage needs is the major benefit of the NUMA-Q 2000, according to Loughery. "We have the capacity to support whatever comes along," he says. "We can have a 100-processor NUMA-Q 2000 and partition it into two different systems. We can mix and match any way we want."

What's come along so far is a 12-processor configuration that supports nearly 4.5TB of storage on devices from EMC Corp. This data is managed by an Oracle RDBMS and is made available 24 hours per day.

Some critics question the true scalability of the NUMA architecture. In response, Loughery says NASD will push that envelope later this year when it expands the server further. Since, aside from a few minor and quickly corrected hardware problems, the server has performed flawlessly so far, Loughery is comfortable with the prospect of scaling the server. "We're confident it will work as advertised," he says.

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Union Pacific gets on track with NCR WorldMark server



Even if it weren't facing stiff competition from the trucking industry, Union Pacific (UP) Railroad would be like any other major corporation in today's harsh business environment: It has to eliminate as much operating inefficiency as possible.

In September 1996, UP realized that migrating from its NCR 3600 server to a new platform would allow it to continue to consolidate hundreds of disparate databases, which were being used by different departments and which had resulted in redundant and often-conflicting information. The platform it selected was an NCR WorldMark™ 5100M enterprise server, a massively parallel processing (MPP) system.

"Our data warehouse environment was growing very rapidly," says Betty Kight, senior manager of systems development at UP's information services division. The data warehouse is housed in the St. Louis data center. (The other data center is in Omaha, Neb., where UP is headquartered.) Data center operations was already responsible for the daily operations of the NCR 3600 system, which used the Teradata RDBMS. But the rapid growth of the environment required a larger and more scalable system.

Even at the start, Union Pacific was aware that the data warehouse was going to have to support a very large database environment. Currently, the NCR 5100 has 1TB of data, consisting of accounts payable, equipment maintenance, marketing, and car and locomotive movement information. Furthermore, this information needed to be easily accessed

by many users. Today, there are more than 2,400 users on the 5100.

Union Pacific has installed three 5100Ms, one for testing, one for development and one for production. The production system is a 16-node WorldMark, with four Intel processors per node, for a total of 64 processors. "With the 5100M, there's more flexibility for adding nodes," Kight said. "To add capacity on the 3600 you had to add processing power in order to retain the same performance. On the 5100M you can add nodes or CPU capacity independently of one another." UP is currently in the planning and budgeting process for 1998 capacity, she notes.

Because both the 3600 and 5100M were Intel-based and both ran Teradata, UP was able to move its data to the new platform relatively easily. The migration period began in the fall of 1996. Much preparation work was required, but in the end, Kight says, "We were down less than an hour." And, by moving from one IA-based system to another, UP managed to leverage the expertise that it had already acquired. "We avoided support costs and everything else that goes along with changing an architecture," Kight said.

By using the 5100M, UP realized many benefits, but the most significant was in availability. "The 5100's new availability features, including RAID5 and redundant MPP interconnect, have substantially increased availability, and we have realized dramatic improvements both in scheduled and unscheduled downtime," says Kight.

Continued from p. 3

doesn't mean that companies can afford to throw out what they have. However, this change is causing organizations to re-examine their mainframe-in-the-data-center strategies. Many are putting new or re-engineered applications on distributed UNIX or Windows NT platforms. They're keeping their mainframe, but using it for a different purpose. "Mainframes will be around for years, but their use will be primarily as database or very-high-rate transaction servers," says Norton Greenfield, who heads Implements, Inc., a Wayland, Mass. consulting firm.

Continued on p. 11

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Inside much more than PCs

Although the ubiquitous "Intel Inside®" advertising campaign has linked Intel microprocessor technology with personal computers, the Intel architecture (IA) has a long history of meeting companies' high-end computing requirements as well.

In 1981, an El Segundo, Calif., company called Teradata began deploying Intel 8086-based mission-critical solutions in the data center in the form of a mainframe operating environment. (Teradata was acquired by NCR in 1992.) In 1983, Sequent Computer Systems was formed in Beaverton, Ore., to take the Intel 386™ microprocessor into commercial SMP systems. These seminal events opened the glass house to IA.

In 1995, Intel announced the Pentium® Pro processor, which continued IA's push into enterprise computing. Today companies such as Data General, NCR and Unisys, which once built systems around proprietary RISC processors, design their enterprise servers around the Intel architecture. These are just three of the many systems makers that have committed to the Pentium Pro processor for building

high-end systems. Another convert, Fujitsu ICL, already ships an IA-based mainframe and plans to move the rest of its products to IA as well.

Hardware and software suppliers continue to build on the Intel engine. One key capability of the Pentium Pro processor — the ability to address more than 4GB of memory — is being exploited by high-end server manufacturers such as Data General and Sequent. This feature is critical for large database and multi-user line-of-business applications, because being able to address more memory translates almost directly into better online performance for users.

"Being able to go above 4GB to the 64GB addressability that 36 bits gives you allows us to provide a much more balanced system," says Gordon Haff, product manager of enterprise servers at Data General. "If we could only go to 4GB, with our 32 Pentium Pro processors, we would not be able to get the most out of those systems in key database applications."

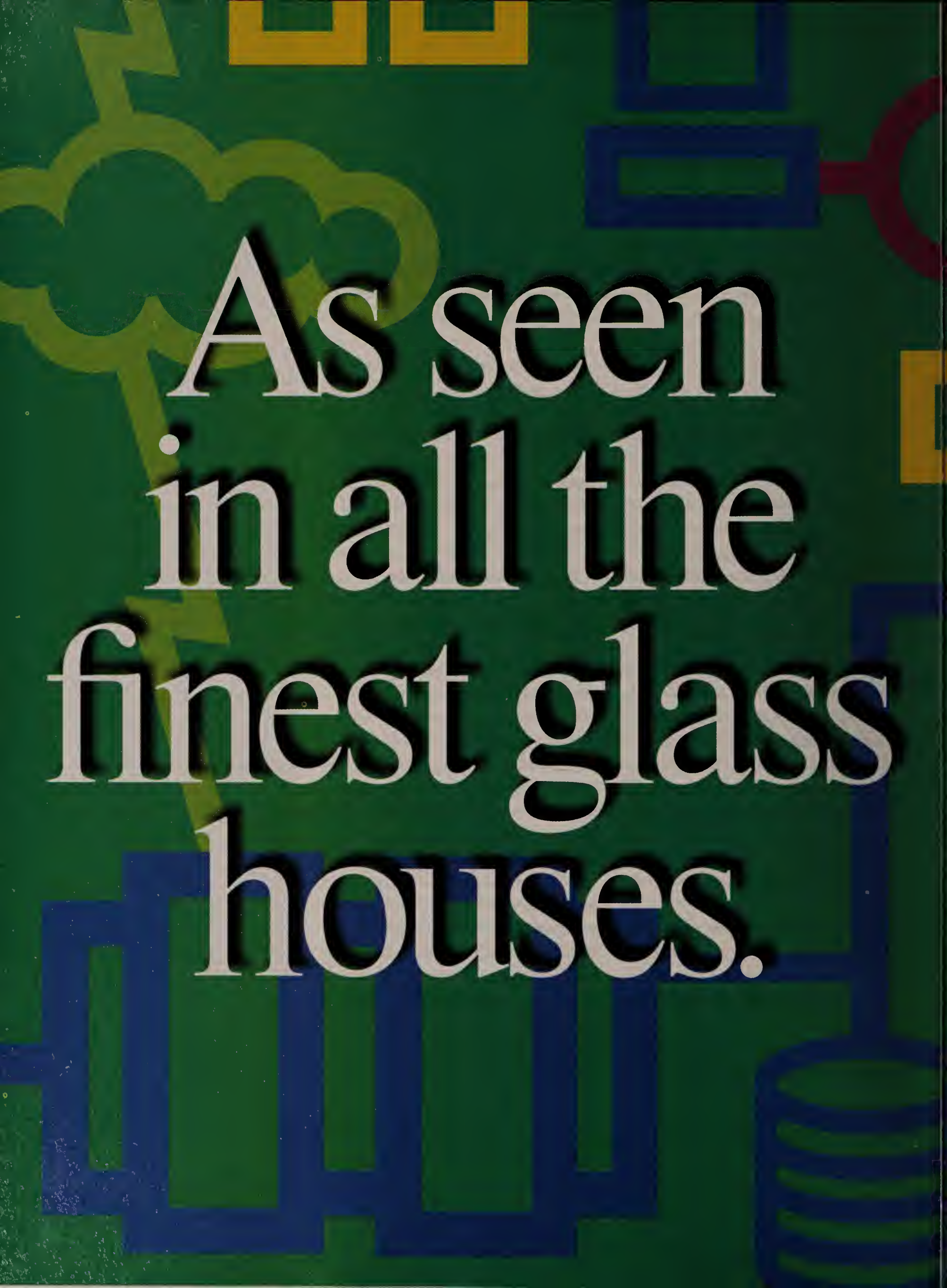
Haff notes that 36-bit addressability is a capability of the Pentium Pro processor "from a hardware point of

view," but it is implemented in Data General's servers because "we have the operating system support for it."

Sequent, too, takes advantage of greater than 4GB memory addressability and will also incorporate Intel's newest and most powerful Pentium Pro processor — with a full megabyte of on-chip cache memory — into its NUMA-Q data center servers.

"For performance-intensive applications, doubling the amount of cache memory on the processor will mean a significant performance enhancement," says Jeff Pancottine, vice president of marketing with Sequent. "The larger cache feeds the processor, so you're sure of getting every ounce of performance available for your applications."

Systems makers that have chosen the rapidly evolving Intel microprocessor as their silicon engine can not only deliver highly capable solutions today, they also have a leg up to meet their customers' demands for even more computing power tomorrow. As new members of the Intel architecture family appear, leading systems suppliers will take these engines and deliver even more powerful solutions.



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Intel-based AViiON servers provide cure for hospital's info access woes

Data General

Based in Nashville, Tenn., Columbia/HCA Healthcare Corp. is a \$20 billion organization that, through mergers and acquisitions, has grown to the seventh largest employer in the U.S. Columbia/HCA currently consists of 340 hospitals, 500 home health care agencies and 200 surgery centers in 36 U.S. states and three countries.

Columbia/HCA still uses an IBM mainframe to run legacy applications such as general ledger, payroll and patient billing. But the corporation realized that, to improve information access and trim systems management costs, it needed to standardize its hardware and software. To execute that strategy, it has turned to AViiON® servers from Data General (DG) which are built around Intel processors. The organization runs four mission-critical applications on these systems.

The first was consolidating their E-mail systems. Columbia started with 15 now has just three. (In time only Microsoft Exchange will be used.) The trimmed down system runs on two AViiON servers, an AV 3600 and an AV 2100. Each is based on Intel 200MHz Pentium® Pro processors. Columbia now is rolling out 30,000 more Exchange seats in the next 18 months. This will require 30 additional AV 3600 servers.

Columbia also moved its Internet and intranet applications to an AViiON NT Cluster-in-a-Box. This configuration consists of two dual-processor DG AV 3600 servers in a single cabinet, running Microsoft Internet Server.

The cooperative effort between DG,

Intel, Microsoft and Columbia was "key to the decision to move our Internet platform," says Kathy Markham, vice president of planning and architecture at Columbia Information Systems, a subsidiary of Columbia/HCA. "We were driven by the long-term viability of the system we were buying, so we were committed to using Intel. Intel is a strategic move for new enterprise systems."

That strategy is apparent in the third mission-critical application: providing medical records for the physicians' practices component of Columbia. This application previously ran on DG RISC systems based on a Motorola 88000, but a required software upgrade prompted the decision to move the application to the new strategic platform. It now runs on a multiprocessor Pentium Pro processor-based AV 5900 Enterprise Server in Columbia's central office, plus an AV 5900 in each of seven regional data centers.

The fourth mission-critical application is a data warehouse Columbia will run off a 6-way Pentium Pro-based AV 6600. Markham expects the warehouse to be implemented in early 1998, initially with less than a terabyte of data, but growing to several terabytes.

Although Columbia keeps summary-level patient data on the mainframe, clinical and financial details and discrete item charges are kept at the data center. A data warehouse, notes Markham, will allow Columbia "to roll up these details from a clinical and financial perspective to do more detailed analysis, in order to determine best practices for certain treatments with the lowest cost."

Continued from p. 7

The new data center, which is based on market-driven, standards-based technologies, will take advantage of the advances in distributed technology and vastly improved price/performance, to help IT contribute to achieving competitive advantage.

For CIOs, some major questions remain. How do we find the right mix of technologies and skills so the organization can improve its flexibility and agility? How do we use the mainframe for maximum benefit? Do we deploy UNIX-based systems for departmental and line-of-business applications? And what role should NT have today and in the future?

The answer for many leading organizations has been Intel architecture-based solutions. These enterprise systems have been selected to host mission-critical applications such as data warehouses, decision support systems, OLTP and multi-tier line-of-business applications like SAP R/3. The list of organizations running their data centers on IA reads like a Who's Who of Big Business. Bridgestone Corp., Columbia/HCA, Hallmark Cards, The National Association of Securities Dealers, Reuters, Union Pacific Railroad and Wal-Mart are just a few of the many organizations that have already adopted this new, agile data center computing model.

At information provider Reuters, more than 50,000 users rely on an IA-based solution for access to up-to-the-minute data. Wal-Mart is supporting a data warehouse of more than 24 terabytes of data. A major financial institution in the U.K. is processing more than 25,000 transactions per second.

Power is good

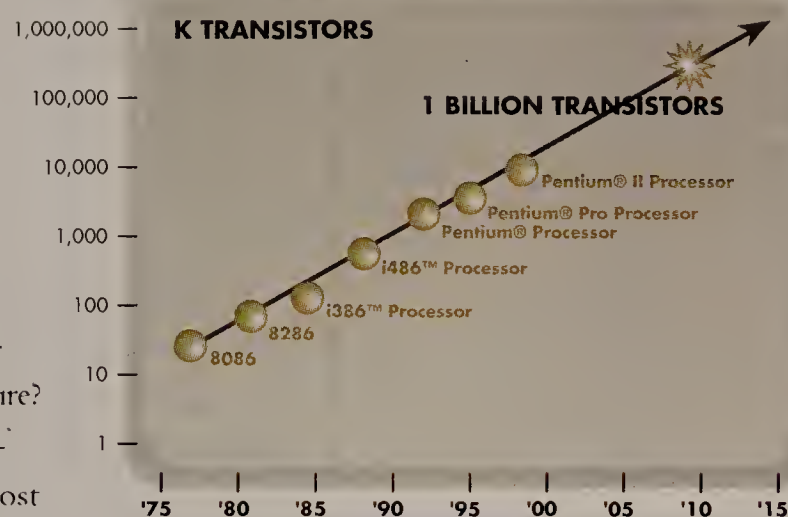
History has taught us that the need for additional processing power is insatiable. The industry is now focusing on taking the basic technology building block — the Intel microprocessor — and constructing even more scalable servers with it. And CIOs are looking to server manufacturers for the next power platform beyond large-system SMP.

There are two ways to implement scalability in a server. You can add more processors in the same box (today's SMP model) or you can link individual boxes together (clustering). In the mainframe and minicomputer arena, clustering has proven itself over time. Both SMP and clustering designs are widely available in highly scalable IA-based servers. As critical applications are deployed on these servers, the two features that clustering provides — scalability and high availability — continue to be must-haves before a CIO is willing to sign off any purchase agreement.

Another criteria for selecting a data center solution is headroom: the system's ability to meet the company's evolving computing needs over time. Companies have always pushed the limits of their computing resources, and they will continue to do so in the future. Every significant corporate computing trend of the past decade — LANs, client/server computing and the

Continued on p. 12

Transistor Count Continues to Follow Moore's Law



Source: Intel

Headroom is the ability of a system to meet a company's evolving computing needs over time.



Continued from p. 11

Internet — has required more processing power and more bandwidth. Can a processor architecture whose roots are in the PC meet this continuing performance challenge?

Moore's Law delivers

In 1965, Intel co-founder Gordon Moore made a prediction now known as "Moore's Law." It posits that transistor density on microprocessors will double every 18 months and so far, it has proven amazingly accurate (see graph on previous page). Processor performance follows this curve closely, doubling roughly every 24 months. As this trend is forecast to continue, by 2011, Intel processors will contain one billion transistors and will deliver around 100,000 MIPS (millions of instructions per second). What this means is that as demand for performance accelerates, the Intel architecture will continue to evolve to deliver the next step in computing power.

The current platform for delivering this power is Intel's IA-32 family of processors, which includes the Pentium Pro and Pentium II processors. It gives IT professionals everything they need today — a complete set of resources to build, use and manage a mission-critical computing function. Intel is committed to advancing the IA-32 architecture to provide the foundation for data center solutions as performance needs increase.

And Intel is already at work developing a complete solution set to expand the Intel architecture family with a new, next-generation architecture — IA-64 — for servers and workstations. The first processor in the IA-64 product family is code-named Merced. From the outset Intel's Merced design team set a challenging goal: To design a highly scalable processor that will handle any enterprise application. It must achieve world-class levels of performance, while remaining compatible with the thousands of applications running on IA-32. At this time, the Merced team is working on completing the processor design and preparing state-of-the-art manufacturing facilities to build the new chip.

Being able to support legacy IA-32 applications is crucial for cost-effective implementation of Merced processor-based enterprise servers. IT shops around the world have a huge investment in custom-developed, as well as purchased, enterprise application packages. Merced is designed to protect users' investment in both software and training. IT shops will be able to run the full complement of today's IA-32-based software, from operating systems to applications, on Merced processor-based systems without recompilation, and without software emulation or translation. They can then

selectively choose recompiled applications in order to get the greatest performance increase out of the blazingly fast new processor. This twin benefit of software compatibility and improved performance has played out before for IT shops standardizing on the Intel architecture.

CIOs who are familiar with IA are finding this long-term architectural compatibility a compelling reason to select IA-based solutions today. Burlington Coat Factory, a clothing retailer in Burlington, N.H., started off using systems based on the Intel386™ processor; now it uses Sequent servers based on the Pentium Pro processor. "We've been at a continuous stream of binary-compatible hardware upgrades with Intel

*Companies have always
pushed the limits of their
computing resources . . .*



processors," says CIO Mike Prince. "In the future, as technology unfolds, the Intel architecture underneath will give us the opportunity to see further improvement in processor capacity without any migration problems." At Columbia/HCA, future growth was also a factor in choosing the Intel architecture. "We were driven by the long-term viability of the system we were buying," says Kathy Markham, vice president of planning and architecture.

Intel isn't the only company committed to the future development of the Intel architecture. Leading software developers and systems manufacturers are already developing hardware and software to take advantage of the coming wave. Baan, Microsoft, Oracle, the Santa Cruz Operation, SAP and SAS Institute have already announced plans to include

Continued on p. 14

**INTEL'S MERCED DESIGN TEAM
SET A CHALLENGING GOAL:
TO DESIGN A HIGHLY SCALABLE
PROCESSOR THAT WILL HANDLE
ANY ENTERPRISE APPLICATION.**

NUMA: a new approach to scalability takes hold

Computer architectures have evolved steadily. The newest architecture, cache-coherent non-uniform memory access (NUMA) technology, is tackling mission-critical, data center-class applications by blending massively parallel processing (MPP) horsepower with symmetric multiprocessing (SMP) ease of programming, systems management and scalability. NUMA technology lets vendors cost-effectively tie processors together in configurations, a scalability required for OLTP and database applications.

A NUMA system is built from a collection of "metanodes," linked by a high-speed interconnect. Each metanode consists of one or more processors in a classic SMP architecture. The main difference between NUMA and MPP systems is the speed of the interconnect between processors or metanodes.

Sequent Computer Systems and Data General (DG) are among the first companies to deliver NUMA-based systems aimed at the data center. Sequent's NUMA-Q™ 2000 and DG's AViiON™ 20000 families

bring new levels of scalability to enterprise environments. DG's NUMA machines tie 32 Pentium Pro processors in a configuration capable of supporting 32GB of memory and 100TB of storage.

"Mainframes are past their prime," says Casey Powell, chairman and CEO of Sequent. "We've delivered NUMA-Q 2000 to extend the power and affordability of SMP into the data center . . . but at a fraction of the mainframe cost." Entry-level NUMA-Q 2000 servers start at \$242,000, and customers testing the systems have seen performance gains. "These systems scorch," says Mike Prince, CIO at Burlington Coat Factory, a Burlington, N.H. clothing retailer that has just installed three NUMA-Q 2000s.

The NUMA-Q 2000 family is also binary compatible with the company's Symmetry 5000 SMP servers, preserving investments in application software. Customers can even mix Symmetry and NUMA-Q 2000 nodes in the same cluster.

Customers using the AViiON

20000 in such applications include GE Retail Systems, which uses an AV-20000 in a full production commercial data center type of environment, and Sainsbury's, the largest grocer in the United Kingdom. Sainsbury's is using the system for a one 1TB data warehouse application (that it plans to extend to 3TB). Although a data warehouse is not a traditional OLTP application, in this case the warehouse was mission-critical to Sainsbury's, notes Gordon Haff, product manager for enterprise servers at Data General, because the ability to access and analyze vast amounts of data from their cash registers is an essential ingredient to their success.

Another customer using the NUMA-Q 2000 is the National Association of Securities Dealers (NASD). The securities self-regulatory organization currently runs a 12-processor NUMA-Q 2000 system with 4.5TB of disk storage, but plans to expand the server even further as its data warehouse and its needs for processing power continue to grow.

Santa Cruz Operation, SAP and SAS Institute have already announced plans to include support for Intel's IA-64 architecture at launch. Top manufacturers like Compaq, Hewlett-Packard, Hitachi, ICL, NeTpower, Sequent, Siemens-Nixdorf and Unisys have also committed to building high-performance systems based on Merced technology.

However, the coming Merced processor does not mean that Intel will stop advancing IA-32. Both processor families will co-exist, powering data center solutions. Intel is investing millions of dollars for new IA-32 processors, meaning that the proven IA-32 architecture will continue to deliver solutions for business-critical computing for years to come.

Mainframe-class reliability and manageability

There is broad industry acceptance of the Intel architecture's impressive performance and cost advantage. But many doubt these distributed servers can match the mainframe's levels of reliability and manageability.

The good news is, today's high-end IA-based systems have reliability and manageability features that rival or surpass those of mainframes. Sophisticated fail-over mechanisms, redundancy, mirrored disk drives, clustering and other technologies borrowed and refined from mainframe computing give these new systems world-class reliability.

Where manageability is concerned, virtually all high-end IA-based systems today offer sophisticated features for account management, disk backup, printer and terminal support, inter-system communication, configuration management, database monitoring and other critical functions. Management software typically feeds into SNMP software suites in use in other areas of the company. Although these systems feature many processors, suppliers have taken pains to ensure that management is as simple as single-node systems.

With the advent of the Pentium Pro processor, the Intel architecture has arrived in the data center in a big way. Systems suppliers are taking advantage of the built-in multiprocessing capabilities of these chips to link dozens or even hundreds of them into high-performance, scalable systems. These systems are in full production today and are already handling some of the largest transaction loads and databases on the planet.

This new class of systems provides all the performance and reliability of mainframes with the added features of flexibility, agility, affordability and scalability. This more unified processor architecture causes purchase costs, support costs, software development costs and management complexity to go down, and reliability to go up.

"By staying with the Intel architecture, we avoided support costs and everything that goes along with changing an architecture," says Betty Kight, senior manager of systems development at the information services division of Union Pacific Railroad. More important than cost savings, IA-based solutions are improving companies' ability to adapt to changing business priorities. This more flexible IT infrastructure gives organizations the agility they need to respond to fast-changing

*...and they will continue to
do so in the future.*



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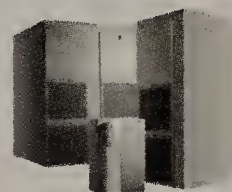
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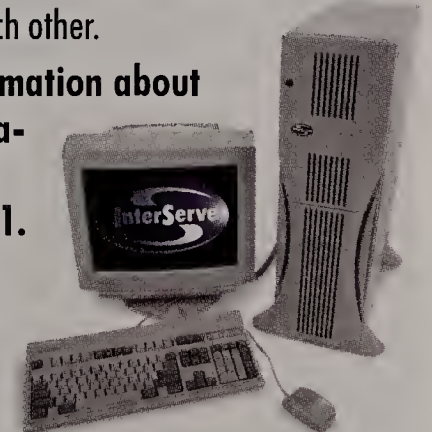
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Trendlines

tability," Lewis told *CNN*. In addition, there can be physical symptoms as well, including digestive problems, hypertension, high blood pressure and sleep disorders.

As part of the study, Reuters interviewed about 1,300 managers in the United States, the United Kingdom, Hong Kong, Singapore and Australia. One-third of the managers said they suffered from stress-related health problems induced by information overload, according to *CNN*. Almost two-thirds said their personal relationships suffered, and 43 percent said they had trouble making important decisions because of information overload. Said Lewis, "I think there are people out there who are dying simply because they're getting too much information, and they don't know how to handle it." ■

Career Moves

On Aug. 1, **Cinda Hallman** became global vice president of integrated processes and systems at chemical processing company DuPont Co. In her new position, Hallman will retain responsibility for the company's information technology. Robert R. Ridout will succeed her as the new CIO and vice president of information systems.

The secretary of the Navy appointed **Marvin J. Langston** as the first Department of the Navy CIO in June. Langston will report directly to the secretary of the Navy while retaining his position as a deputy assistant secretary of the Navy. ■

CORRECTION The chart on Page 117 accompanying "What Have You Done with IT Lately" in the Sept. 15, 1997, issue contains inaccurate data. The table below shows the correct data.

Also, the table on Page 118 contains a typographical error. The percent of respondents with an external Web site in full production should read 52. ■

IT budget as percent of company's total revenues

INDUSTRY (NUMBER OF RESPONDENTS)	Average revenues (in millions)	Average IT budget (in millions)	IT as % of revenues
Finance (25)	4,120	200	4.9%
Manufacturing (29)	7,178	84	1.2%
Business svcs./consulting (5)	8,279	206	2.5%
Health care (19)	1,222	29	2.4%
Retail/wholesale (26)	2,427	29	1.2%
Telecom (10)	4,597	402	8.7%

SOURCE: MAY 1997 CIO/MORGAN STANLEY SURVEY

FLASHBACK

10

Years Ago
In CIO

October 1987

It was the beginning for *CIO* magazine, and the title of CIO was just starting to be recognized as an executive position. In our September/October 1987 issue, we ran the first of many articles to expound the responsibility of the

"new" CIO to help an organization harness the power of burgeoning information technologies. In "Selling the Information Vision" (www.cio.com/anniversary/), James F. Sutter, vice president and general manager of information systems at Rockwell International Corp., described the traditional mind-set of IT leadership when he noted that there "was a tremendous concentration on the internal at many MIS and data-processing organizations in the past, and this tended to develop a gulf between general management and MIS." Sutter, a *CIO* editorial adviser, will retire from the aerospace company later this year.

In the same article, James C. Wetherbe, director of the MIS Research Center at the University of Minnesota, summed up the state of the MIS manager in 1987: "Only 25 percent really understand what it is they should be doing. The other 75 percent are at risk." The risk was that corporate executives would recruit their CIOs from outside the MIS department, leaving the middle IT managers forever mired in the soup of Cobol code. Today Wetherbe, who has added the FedEx Center for Cycle Time Research at the University of Memphis to his directoral duties, says the numbers have gotten better. More than 50 percent of IS managers now know what it takes to be a good CIO. "The vocabulary of IS managers is much more about business and strategic issues than ever before," Wetherbe says. At the same time, the game's gotten much tougher and the stakes higher. "It's become a very difficult, risky position; if you steer the company in the wrong IT direction, you can take it down. I have enormous respect and empathy for anyone doing the job now."

Although *CIO* no longer needs to warn IT managers about the need to commune with the business in order to rise to the CIO level, we still find ourselves writing articles about such fundamental issues as how to sell the need for infrastructure renewal ("A Tough Sell," *CIO*, May 1, 1997) and the difficulties of aligning IT priorities with business goals ("Alignment Revisited," *CIO*, May 15, 1997). The more things change...well, you know the rest. —Richard Pastore





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Knowledge in Books

A review of some of the latest literary arrivals on the knowledge management scene

A FLURRY OF BOOKS ABOUT knowledge management has recently hit the streets. You can't possibly read them all, so consider this the Cliff Notes version of them, and save some time and money.

First, though, think about the book as a distribution channel for knowledge. It has some impressive credentials—highly portable, batteries not necessary, random access and great heaping hunks of knowledge at an average rate of 30 or 40 words per penny. The downside in knowledge management terms is that I'm not sure whether anybody reads the bloody things anymore. I've been tempted to put a coupon on Page 247 of my next book (yes, it's about knowledge management, so don't trust anything I say in reviewing anybody else's!) offering any diligent reader \$50. I'll just sit back and learn how many cover-to-cover consumers there really are. The other problem is that in most organizations, reading a book at work is not considered an act befitting continued employment—even in companies making a big deal of their knowledge management initiatives. If you figure out that contradiction, please write a book about it.

One somewhat bizarre attribute of this flurry of KM tomes is that most have the same name—*Intellectual Capital*. Good title, but not that good. Anyway, the best of the three with this title (and the only one worth purchasing—you just saved \$52) is by Tom Stewart (Doubleday Currency, 1997), a writer for *Fortune*. Stewart considers himself a “business sociologist,” but in

this book he's actually woven a tapestry from economics, strategy, accounting, history and perhaps a bit of sociology. It's a good overview of the knowledge management movement, with lots of examples. I was frustrated by it in two ways, however, only one of which really matters. The minor irritation is that the prose is a little precious for a business book. The serious frustration lies in Stewart's reportorial bent; he describes the work of a hundred companies and quotes a few hundred sources, but like a good reporter he rarely tells how he thinks knowledge should be managed. More prescription would be very helpful.

The second *Intellectual Capital* I'll describe is from Annie Brooking, an English consultant (International Thomson Business Press, 1996). You might be put off by the mystical-sounding subtitle—*Core Asset for the Third Millennium Enterprise* and you should be. The book is full of similarly annoying and pretentious mumbo-jumbo. The best sampling of its lack of profundity is found in the 40 “IC Concepts.” The second of these, for example, is “Intellectual capital sharpens the cutting edge.” My personal

favorite is number 11, “Manage human resources.” The book is sprawling and unfocused. It does have one promising section on creating an “audit” of the company's intellectual capital, but even that is flawed by the absence of a detailed example. Despite the author's background in artificial intelligence, there's little in the book about knowledge management technologies.

The last volume with the same name is by Leif Edvinsson and Michael Malone (HarperBusiness, 1997). Edvinsson is director of—you guessed it—intellectual capital at a division of Skandia AFS, a Swedish insurance company. Malone is a Silicon

Valley writer. This is not a very good book—or rather, it's a decent description of a bad implementation of a mediocre idea. The mediocre idea is that

the “intellectual capital” of a company should be measured and reflected in its financial statements. Now I'm as much an intellectual capitalist as the next guy, but there are a couple of problems with this notion. First, a company's market value is already a pretty good reflection of its combination of intellectual and financial capital—witness Microsoft's ungodly market capitalization for one obvious example. Microsoft's CFO has made clear in speech and story that he's perfectly happy with the discrepancy between the company's book and market values. Second, even if it were a

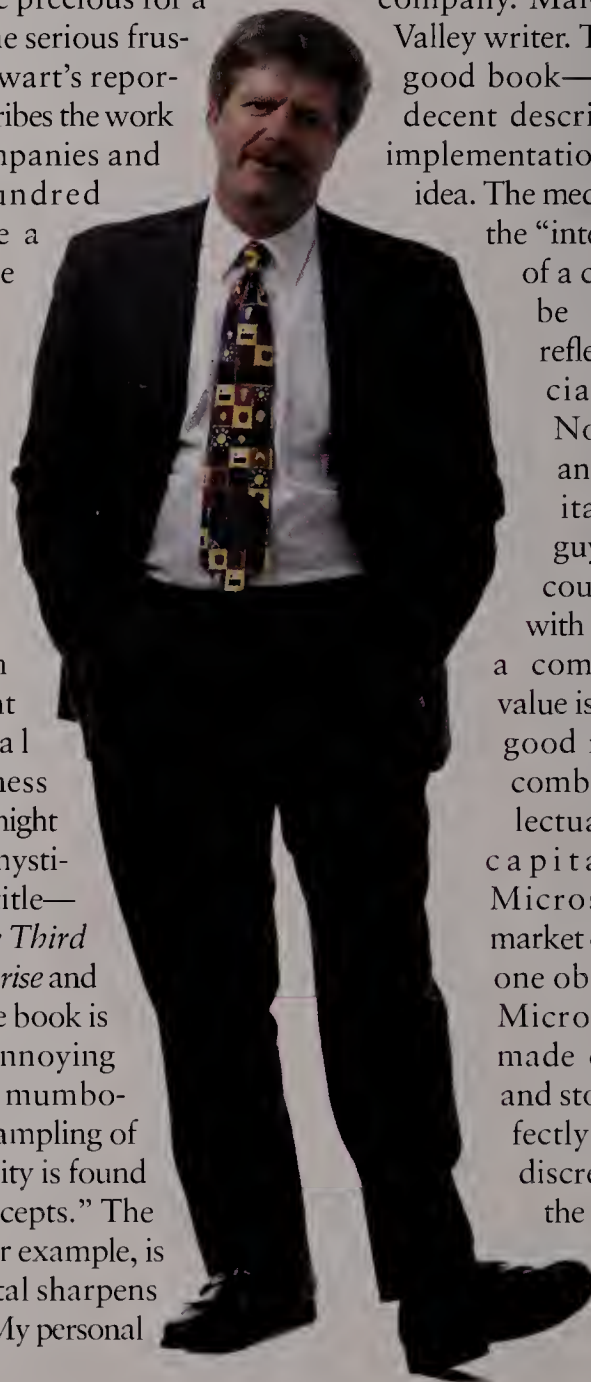


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Think Tank

good idea, you'd have to get the world's accounting bodies to embrace the notion. This group isn't known for its willingness to turn the financial system upside down. And guess how excited the big accounting firms are about auditing intellectual capital? They get sued enough trying to verify financial capital. This idea's not only mediocre, it's also not original; a Swedish executive named Karl Erik Sveiby wrote about it in 1988 and has helped implement it in several companies—including Skandia. More about Sveiby below.

The worst attribute of *Intellectual Capital III* is that it says nothing about how to manage intellectual capital or even increase the amount of it in circulation. No, we hear only about how to measure it. And that's where the bad implementation comes in. The measures—111 of them, believe it or not—range from prosaic to bizarre. Some are conventionally financial—"annual revenues/employee," for example. Some are plain odd, like "IT literacy of customers" and "managers

assigned to full-time temporary employees." Some would seem to be important but have little bearing on intellectual capital for instance, "average age of employees" and "IT expense/employee." Is it better for the company's intellectual capital to have these higher or lower? At Skandia,

Guess how excited the big accounting firms are about auditing intellectual capital?

someone diligently compiles the dubious figures into an annual "IC Report," which is sent out across the land. I have a sneaking suspicion that this is all an effort to convince the world that Skandia is not a boring insurance company but rather an exciting intellectual capital company and hence worthy of a higher stock price.

A much better 1997 book on the same

topic has been written by Sveiby himself in English, *The New Organizational Wealth: Managing and Measuring Knowledge Based Assets* (Berrett-Koehler). The idea of measuring intellectual capital is still only so-so, but there is advice here on how to create and manage knowledge-based assets as well. There is a little too much of the now-becoming-tiresome rhetoric about the knowledge age (Chapter Two is entitled "Tapping into the Limitless Resources of the Knowledge Era"), but it's leavened with good examples, helpful summaries and "Advice for Managers" sections at the end of chapters and is a much more data-based and analytical tone than *IC III*. Sveiby lays out a reasonable three-part structure for intangible assets: external structure (e.g., customer relationships), internal structure (organizational structure and procedures, for example) and employee competencies. The end of the book describes a good overall action plan for a knowledge-focused strategy.

Base your network on

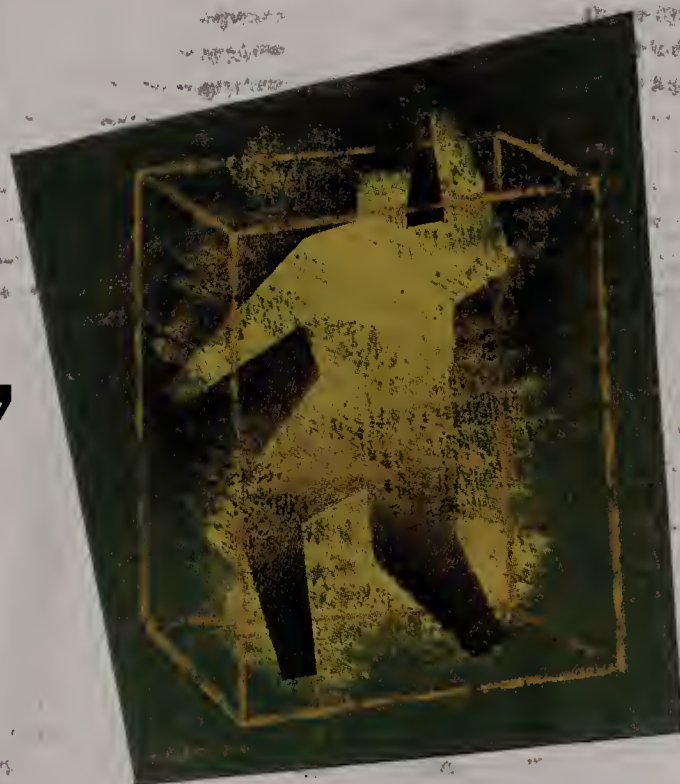
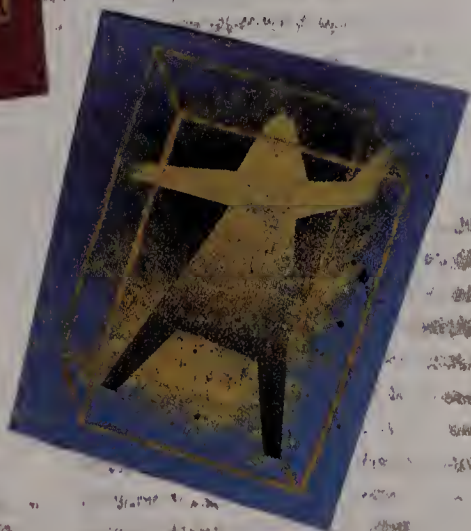
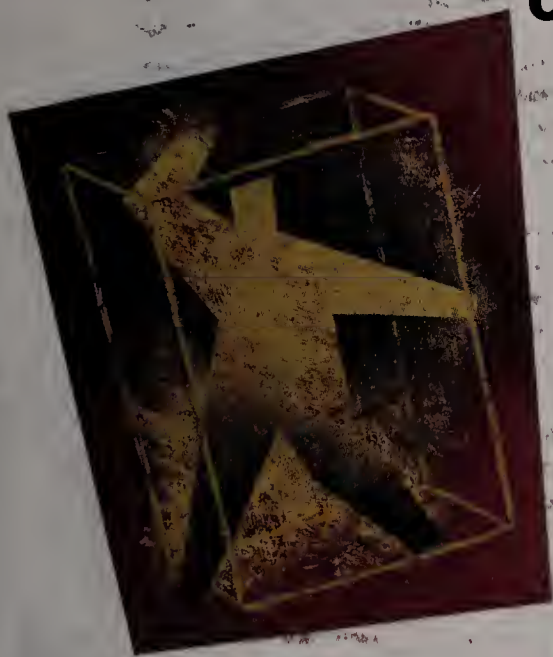
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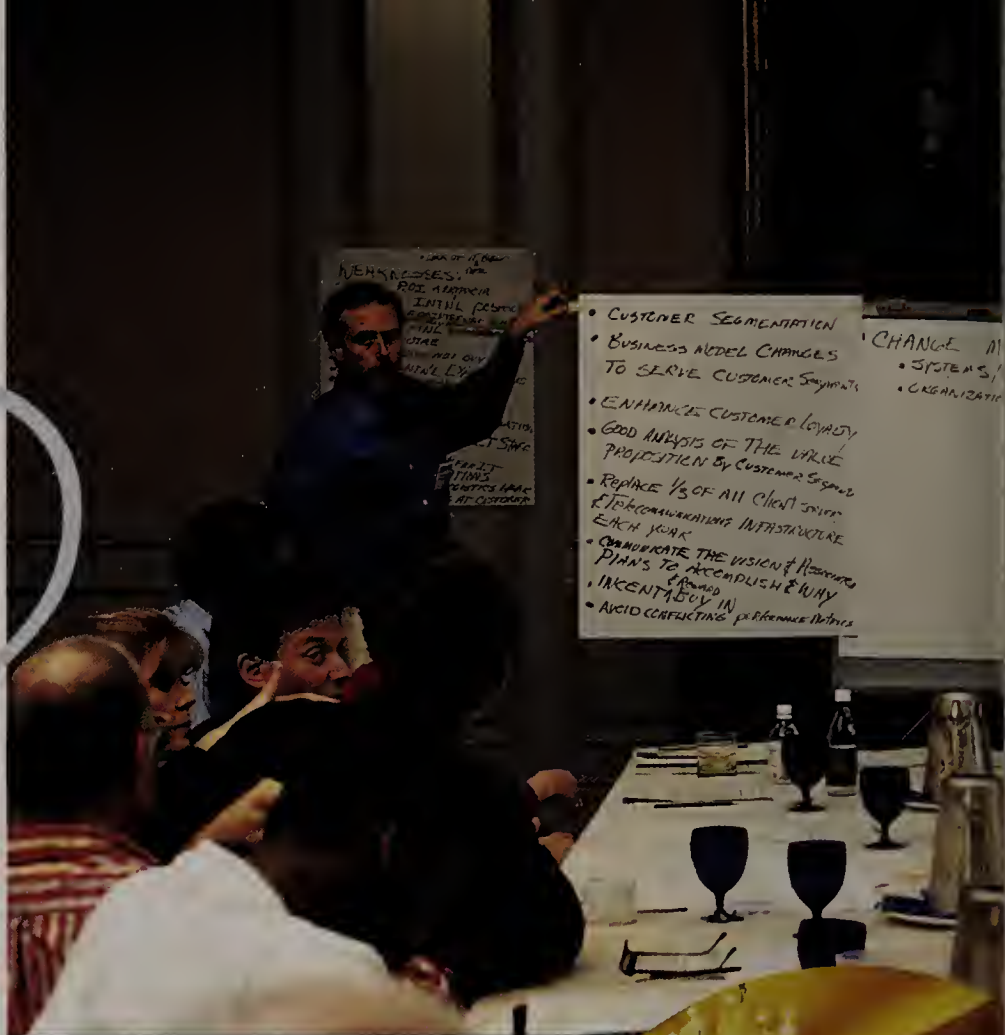
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Channels of distribution and the ways companies add value and organize their work have all changed dramatically over a very short period of time. As we move closer to the 21st Century, explosive new opportunities are being created by the Internet and intranets. Plotting the course in this new world is an extremely difficult and challenging task.

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Think Tank

If you suspect that 1997 is not the first year anyone ever wrote about knowledge, you're right. The current knowledge inning began with a solid line drive in 1994 called *The Knowledge-Creating Company* (Oxford University Press) by Ikujiro Nonaka and Hirotaka Takeuchi, two Japanese academics. (Nonaka is now the Xerox Knowledge Professor at the University of California at Berkeley.) This book is mostly about knowledge creation in Japanese companies, but any Westerner who is interested in knowledge management will find it valuable. If you want to read about the creation of knowledge and of knowledge-oriented cultures in U.S. firms, you should check out Dorothy Leonard-Barton's *Wellsprings of Knowledge* (Harvard Business School Press, 1995).

A series of edited books put out by Butterworth-Heinemann—"Resources for the Knowledge-Based Economy"—are good compilations of previous work on knowledge in article form. Laurence

If you suspect that 1997 is not the first year anyone ever wrote about knowledge, you're right.

Prusak (my co-author on a forthcoming masterpiece) has compiled a collection of articles on the organizational and strategic underpinnings of KM; it's called *Knowledge in Organizations*. Rudy L. Ruggles has gathered articles about knowledge-oriented technologies in *Knowledge Management Tools*. Paul S. Myers edited *Knowledge Management and Organizational Design*, featuring just about every article you'd ever want to read on that relationship. Other books are also planned in this series.

If you're not beaten into total submission on the topic of knowledge, still more books are on the horizon. I've mentioned in a not-so-subtle way that

Larry Prusak and I have one, which will hit the streets in November. *Working Knowledge* (Harvard Business School Press), purports to offer pragmatic advice on such topics as building a set of roles and responsibilities for knowledge, managing knowledge projects, and selecting and implementing knowledge technologies. Paul Strassmann, the dean of IT economists, has begun to apply his considerable analytical abilities to the measurement of the value of information and knowledge. He has already published one volume in a promised trilogy on the subject. It's called *The Squandered Computer*; find out more at www.strassmann.com.

Enough already! Stop reading and get back to work! **CIO**

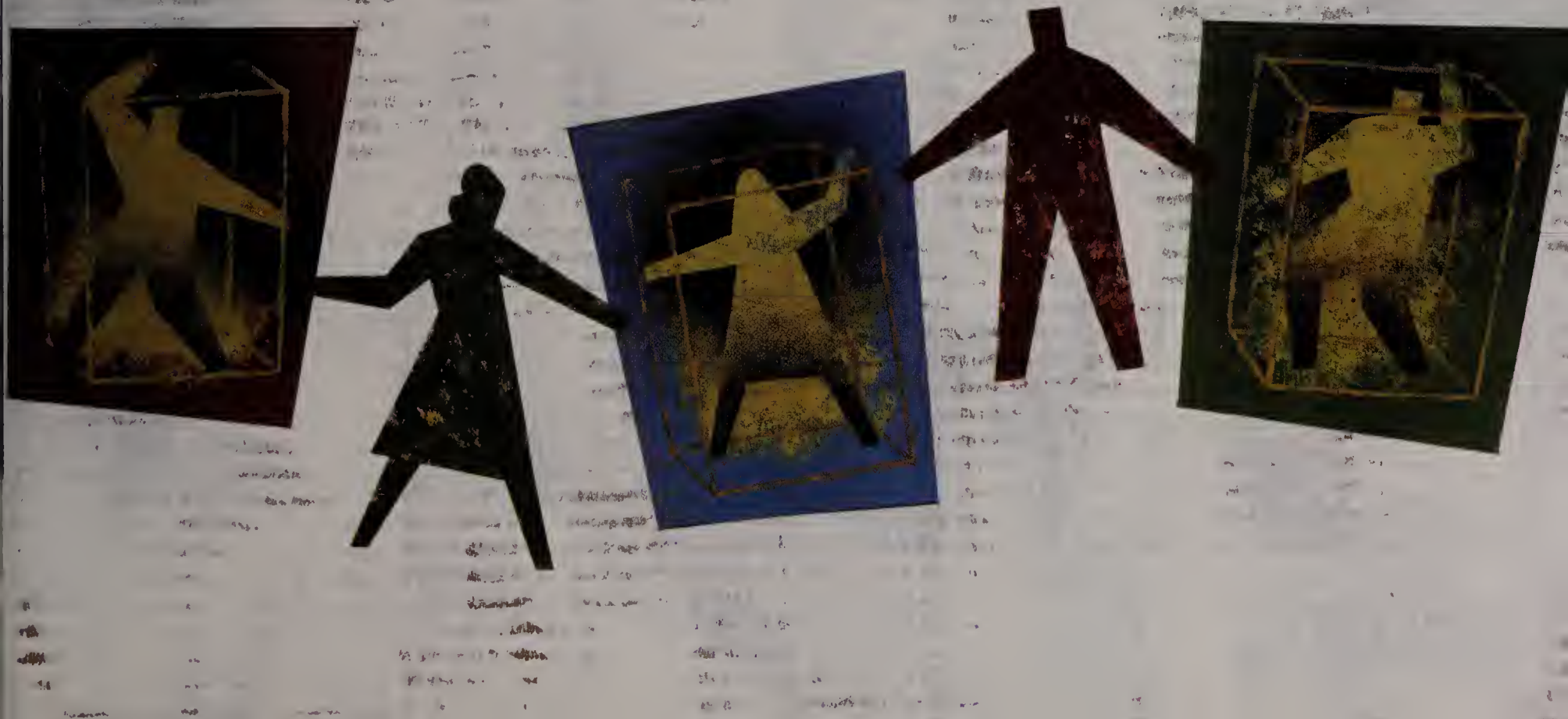
Thomas H. Davenport is a professor and director of the Information Management Program at the University of Texas at Austin. He welcomes reader comments at davenport@mail.utexas.edu.

Break out

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see the end beyond

the technological means.



Click Here for an Agent

Call centers prepare for the rising tide of incoming e-mail, voice and video communications

BY DAVID COOPERSTEIN

AN INTERNET CUSTOMER visits an online florist to order a Mother's Day bouquet and then calls to check the status of the order. Uh-oh—the customer service agent doesn't see the order onscreen because the call center's records are not in sync with the database for Internet-originated orders. Now the customer is worried. Did the order go through? What about Mom? And the call center manager is worried: Will this customer ever return?

Call center workers have little facility with the Internet, even to the point of not knowing how to check the status of an online order. Though call center technology has improved in small, measured steps during the past five years, agents know only the phone; anything else is not their bailiwick. Forrester estimates that call centers handle 95 percent of the billions of customer interactions taking place today with e-mail and letters accounting for the remaining 5 percent. Advances that improve customer transactions by phone include interactive voice response (IVR), screen pop technology and improved workforce management software. IVR allows customers to use the numbers on their telephone keypad to access systems; screen pop technology puts customer records on agents' screens. But the Internet has introduced a future where customers will interact with companies through a variety of self-service and live interactions, combining voice, graphic, written and eventually video communications. E-mail and Web sites are just the nose of the proverbial camel under the edge of the tent.

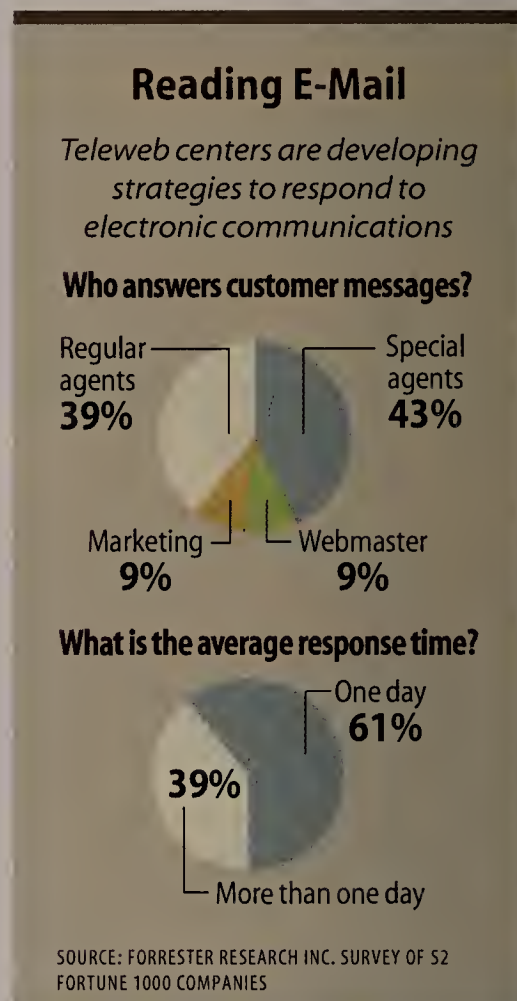
Forrester's research with Fortune 1000 call center managers leads us to conclude that call center managers are virtually ignoring the Internet. Companies with Web sites and call centers are not exploring the benefits of linking the two. Furthermore, the most frequent Internet customer interaction, e-mail, lacks a process. Current usage levels (most call centers receive fewer than a hundred e-mails a day) are not causing managers anxiety, but a bigger flow could wreak havoc.

Customers Want Contact

Over the next five years, the Internet will displace the telephone as the primary interface between companies and their customers. Four drivers will power the Internet's ascendance.

■ **Frustration with IVR.** IVR appeared about 10 years ago, ostensibly to replace the agents who answer the basic questions a customer has and to help route calls more efficiently. Despite growing numbers of customers who press the "0" bailout button, IVR is becoming the front end to more call centers. When coupled with automatic number identification (ANI) and computer telephone integration (CTI), IVR can be a powerful tool for reducing talk time. But customer frustration levels have remained high, particularly when obtaining a response requires 16 options and multiple lists of nine menu selections only to arrive at "Please hold for an operator."

■ **Interminable hold times for customers.** Despite best efforts to improve response time and efficiency, a call center's biggest expense is staff, a



situation that has managers reducing the number of agents while leaving customers dangling on the line. The Internal Revenue Service's taxpayer assistance line is notorious for its eternal hold times—more than an hour as April 15 approaches. While most call centers measure hold times in seconds, some purposely plan long wait times—America Online tries to direct callers to the help desk chat rooms by setting telephone response times to 30 minutes or more.

■ **The e-mail explosion.** E-mail use is growing at an extraordinary rate—in the United States, the number of users is expected to reach 50 percent of the population by 2001, up from 15 percent of today's population. More than 137 million e-mailboxes exist worldwide, according to a report by Telecommunications Reports International Inc. But today's call centers handle billions of contacts per year. Even if only 5 percent of all current interactions became e-mail based

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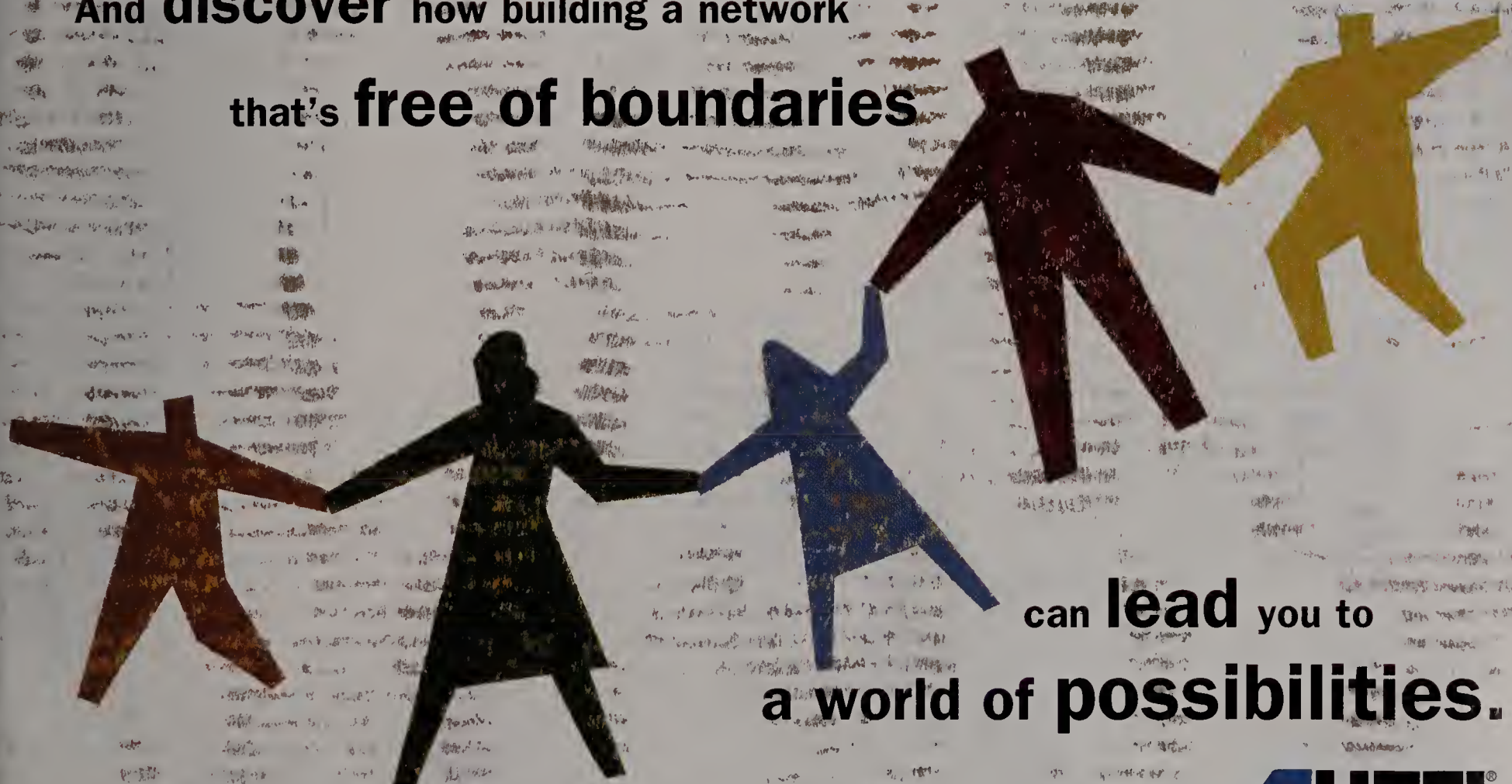
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Forrester View

and if there were no growth in the total number of call center interactions, that would amount to hundreds of millions of e-mails to call centers per year.

■ **Lowering cost of sales.** Universally, lower costs mean higher profits. Ideally, the Web enables self-service transactions to take the burden of live interaction out of the equation, but Web-based commerce has reached into consumer wallets far slower than expected. Customers who wish to order a bouquet from *www.800FLOWERS.com* may look for the gift on the Web site, but for the final transaction—to ensure delivery time and place—many customers find a live agent more reassuring than a click of the “order now” button. Rather than lose the Web-based customer at order time, a simple click should connect customers with order

*The days of
high turnover
in the call
center have
to end.*

forms, preformatted e-mail queries and access to live agents.

The Customer Interaction Center

To address these growing concerns and consumer demands, Forrester expects the role of call centers will change from large-scale telephony exchanges to customer interaction centers. We define these customer interaction centers as the people and technology that will handle remote customer communications, using telephony, the Internet and other media.

Companies will need to design these centers to combine today's voice, IVR and fax communications with future forms of incoming requests—via e-mail, the Web and what Forrester calls teleweb—the integration of Web sites with the call center at the click of a mouse button. Problems will certainly arise, but their resolutions will likely include the following:

■ **Automatic e-mail distributor (AED).** Managing the flow of e-mail is perhaps the biggest challenge for today's call

center managers (see “Reading E-Mail,” Page 36). Rules defining who can and should handle queries, what the responses will include and how quickly queries should be answered require careful consideration, but determining such rules does not require a massive investment. To put together an AED, call center technology buyers must provide Web forms to direct self-service input, look-up engines that find e-mail addresses in the customer database before routing a call, autoreply agents to answer simple queries and to assure callers with complicated questions and skills-based routing to direct e-mail to the most appropriate agent.

■ **Teleweb tools.** A number of relatively simple technologies are needed to implement a successful teleweb capability. Some are available today, like software- or network-based “call me back” buttons, databases for customer trail-tracking of what sites were visited just prior to yours, and page-pushing collaboration

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ONCE UPON A TIME, THERE WAS AN
I.S. MANAGER WITH A NETWORK
PROBLEM. HE WAITED FOR HIS
SERVICE PROVIDER TO RESPOND. HE
WAITED AND WAITED AND WAITED.

The End.

The Moral:

Call WilTel if you want the problem taken care of before you know it's a problem.

allowing agents and customers to share information on Web pages while describing the content over the phone to help close information-intensive or secure transactions. In the future, Internet telephony gateways, multimedia PCs with high-speed access to multimedia content and pervasive Internet video will place teleweb in a central role in electronic retail commerce.

■ **Telephony and the Internet.** The emergence of the Internet accelerates the need to update call center infrastructure not only to accommodate new communication channels but also to maintain, store and improve call center operations overall. CTI helps agents get to the heart of callers' needs by providing them with a snapshot of the caller through customer records and caller input, thereby eliminating the need to ask for information the company already has, such as mailing address, account balances or previous communications. New client/server and intranet-enabled

call center infrastructure—based on PCs and NCs—will bring additional desktop communication capabilities to agents, improving their ability to handle calls more quickly and more productively.

CIO Actions

As the Web generates business-to-business and business-to-consumer commerce, the interface between buyer and seller must adapt to new channels.

■ **Run a trial teleweb for direct sales.** Determine where your high-value direct sales or high-touch information-intensive customers are, and provide them with browser-based self-service and a live agent option.

■ **Raise the bar on new hires.** The days of high turnover in the call center have to end, as required verbal and analytical skills will create a push for more college graduates to enter the "customer service career track." The expectation that they will learn more, be better trained and ultimately take on more responsi-

bility will steer graduates to the phone and e-mail track.

■ **Establish e-mail fulfillment centers.** New tools will allow companies to take direct marketing and telemarketing to new heights. Graphics-enriched e-mail, push-based product updates and electronic catalogs will change the image of spam e-mail into electronic versions of today's snailbox stuffers—only with less environmental damage.

Leading CIOs will embrace the call center as the epitome of their "technology meets the consumer" customer-focused organization. This "front door" the customer enters is as much a technical issue as a marketing issue—the primary means that will bring IT to the profit side of the corporate ledger. **CIO**

David Cooperstein is an analyst with Forrester Research Inc.'s Telecom Strategies. He can be reached at 617 497-7090 or at dcooperstein@forrester.com.



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Fast Fone Farms, Fat Profits

The once-humble call center is taking on strategic importance with the convergence of help desk, telesales and customer service operations. Information technology executives are forging the necessary connections.

BY JIM NASH



ou're in a meeting of your company's top brass. On the agenda is the development of strategies to improve the company's image and customer retention. So why does everyone keep looking at you?

Because you're the CIO.

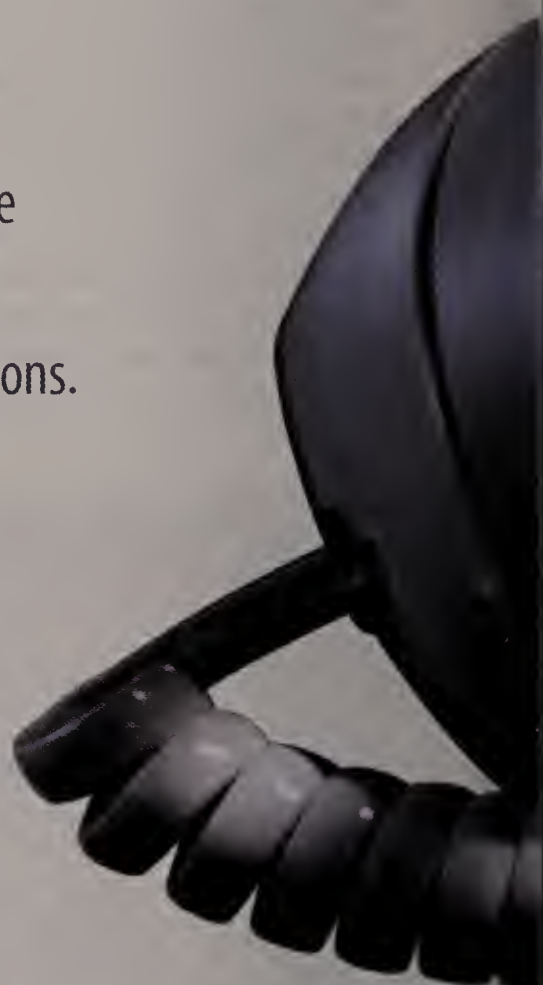
As the traditional providers of information systems, CIOs are naturally involved in decisions affecting data-intensive call center operations, those so-called phone farms—a reference to the dense concentration of employee cubicles in large centers.

But CIOs who think about technology first when addressing call centers will find themselves chasing their tails, according to Peter Perialas, senior vice president in Computer Sciences Corp.'s financial services group in Dallas. "The smart CIO is going for the underlying corporate strategy," says Perialas. As call centers become a nexus of sophisticated new information systems, this white-hot area of growth, innovation and business opportunity is becoming a priority for IS executives. The new emphasis on business drivers is prompting some significant change in IS departments and for the executives who lead them in terms of organization, external customer service and internal customer satisfaction.

Reader ROI

IN THIS ARTICLE, the reader will learn how three companies considered outsourcing their call centers and how

- ▶ HFS Inc. made call centers an executive responsibility
- ▶ Met Life Insurance placed them at the center of its customer service strategy
- ▶ Apple Computer changed them to meet the needs of internal customers



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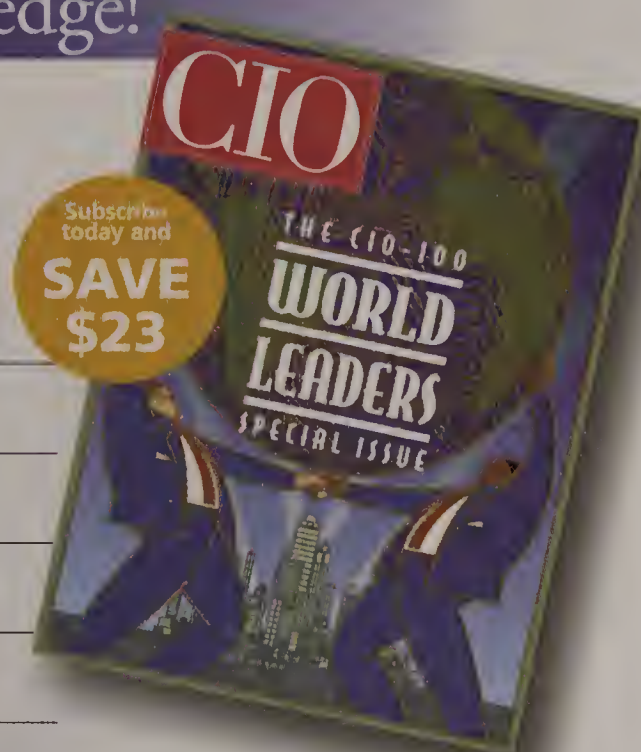
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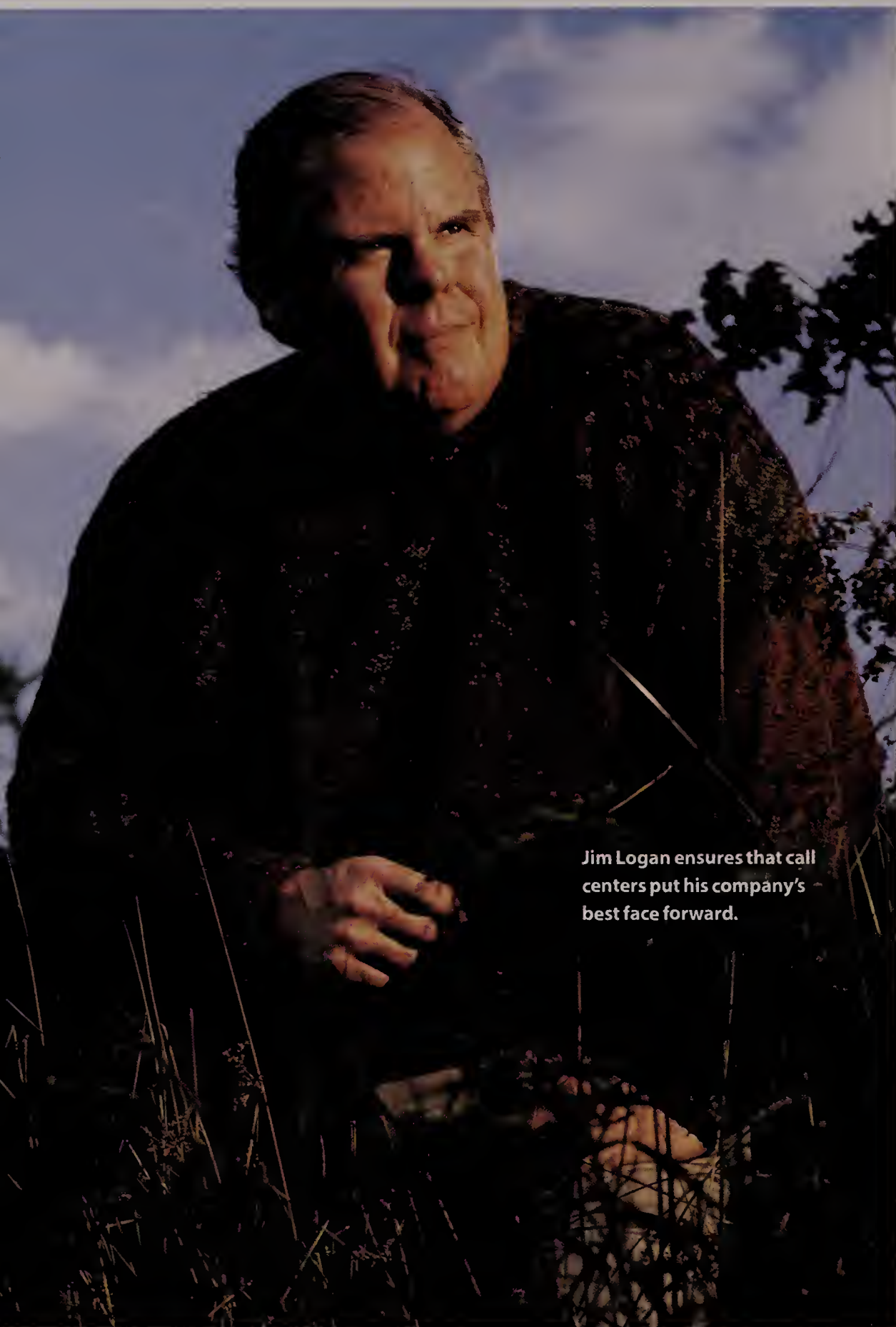


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Doug Patterson changed
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Jim Logan ensures that call centers put his company's best face forward.

Organization

ABOUT TWO YEARS AGO, executives at HFS Inc., a Parsippany, N.J., franchiser of travel-related companies including Howard Johnson restaurants and Ramada Inn hotels, realized their call center needs were rising faster than HFS's corporate structure could handle. They did not wait for a crisis to act. "Part of the way we have

built this company is [by] maximizing our call center operations," says Doug Patterson, executive vice president of telecommunications and call center operations at HFS. Patterson and his fellow executives began looking for structural ways to make call centers more productive.

Seven-year-old HFS was faced with the double challenge of supporting its franchised businesses and their customers

through call centers. The company handles telephone reservations for Avis and all of its franchisees. HFS originally gave responsibility for information and reservations systems to Patterson, then CIO. But it split those duties in October 1996, making Patterson executive vice president of telecommunications and call center operations and Dave McNicholas manager of information services. Now Patterson can focus on a 7,000-person department that spends about \$150 million and handles 80 million calls annually. That call volume is growing by 3 percent to 5 percent a year for HFS hotels, hospitality businesses and Avis. Volumes are growing by 7 percent to 10 percent for its resort time-share outfit, Resorts Condominiums International (RCI).

The division of responsibility has not diluted the IS impact on the telecom department. Patterson says McNicholas's office is a few doors down from his and the two work closely as a team on numerous projects. And the HFS restructuring has had unintended benefits. "As a whole," he says, "call center managers tend to be very conservative. They are reluctant to listen to the CIO who comes in with changes." Now, as head of the telecommunications department, Patterson has been able to win acceptance of routine information systems changes and updates more easily.

Once and Done

AT METROPOLITAN LIFE Insurance Co. in New York, call centers are creating concerns for CIOs that go beyond the bottom line. Starting in 1996 and continuing through 1998, MetLife will be investing 20 percent to 25 percent of annual call center operations costs to fuel the reengineering of its centers.

CIO Jim Logan was asked to help build MetLife's desired image through a call center campaign called Once and Done. Started in the second quarter of 1996, this campaign signaled the company's dedication to getting things done right the first time without having to transfer calls or call customers back. Logan says it makes sense to focus on call centers when building a corporate image because they are becoming one of the primary customer contact points.

Logan's instincts are correct, says



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to collect precious data
a computer would
e than an expensive
calculator.

Not too long ago, companies
stored their data the way they stored
their hard goods—in out-of-the-way
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was the cheapest. But enterprises of
all types are becoming increasingly
aware that accessible, centrally lo-
cated data warehouses are crucial
cogs in the business machine. "Stor-
age is becoming much more strate-
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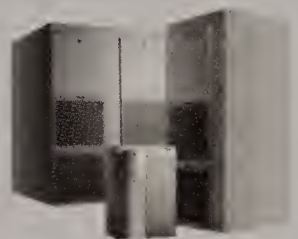


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Transactions in the Age of the Consumer

CALL CENTERS

David Cooperstein, an industry analyst in telecom strategies with Forrester Research Inc. in Cambridge, Mass. (see "Click Here for an Agent," Page 36). "The CIO has to ask a question that marketing vice presidents are more accustomed to posing: 'What do we want to look like to the customer?'" Cooperstein says that whoever responds to a customer call or online query becomes the vehicle of the company's reputation. To project the image of a capable, organized company, the first voice a customer hears on a telephone must be able to answer any question without delay. IS marries technology to company customer strategy.

To a large extent, in any business, product price and quality can be readily duplicated, says Stan St. John, vice president of MetLife's call center operations. Therefore, customer service will increasingly differentiate competitors. Industry research indicates it pays to split hairs when it comes to customer satisfaction, he says. "There is a significant difference between very satisfied and satisfied cus-

tomers," he adds. The difference can be measured in seconds. Callers to MetLife's customer service unit want to be connected with a person in about 15 seconds—that's two or three rings. Customer service surveys show that about 75 percent of "very satisfied" consumers return to buy again, he says, but less than half of the customers describing themselves as "satisfied" customers are likely to come

frames and other computers in various MetLife business units. To achieve the goal, therefore, Logan's team must integrate all databases and computer functions related to customer accounts to give operators almost instantaneous access to all MetLife information that relates to every customer. More than 1 million calls come into MetLife's call centers each month, according to Logan.

On the technology side, the Once and Done campaign demanded new telephone switches—in this case, Lucent Technologies Corp.'s G3r with expert-agent capabilities. The new switches shorten customer wait times by distribut-

ing incoming calls evenly within individual call centers and among MetLife's four call centers in Warwick, R.I.; Utica, N.Y.; Dayton, Ohio; and Tulsa, Okla.

On the staffing side, operators have to rapidly ascertain each caller's needs and then navigate their computer screens to find up-to-the-minute information. Computer networks shunt massive amounts of data across large, heterogeneous systems. Through it all, the oper-

About 75 percent of "very satisfied" consumers return to buy again; but only about 30 percent of "satisfied" customers are likely to come back.

back. Quick responses to phone calls and rapid, accurate service once connected are critical components in boosting customer satisfaction, says St. John.

MetLife has given its call center operations a specific mandate: The company's 1,250 call center operators should be able to handle about 90 percent of their customers in one phone call without a single transfer. But the necessary information might reside on any number of main-

Bringing Back Pizzazz

The creativity of information executives is expanding the call center envelope

METROPOLITAN LIFE Insurance Co. CIO Jim Logan describes a U-curve of excitement:

"In the '70s, technology was still automating business processes. We in IT were the magicians who would swoop down and automate. As time went on, things got so ho-hum. IT lost its pizzazz. What we did wasn't arcane and mysterious; it was just something that needed to be done. Now it's coming back up that U. It's easy to get excited about [information systems] again."

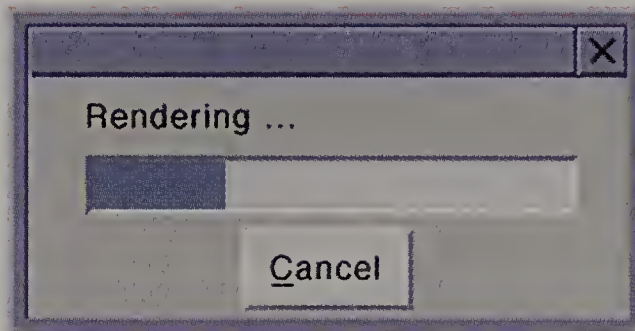
Logan is excited about helping Stan

St. John, MetLife's vice president of call center operations, in experimenting with a concept called the Super Associate, a project exploring how many products one MetLife call center associate can handle. Right now, customer service associates become experts in a single insurance product, but St. John wonders if an associate could support more than one by using a hyperintuitive interface, sophisticated phone switches and lightning-quick access to databases. "I have no vision that any one associate can handle 10 products," he says, but he's looking for ways to leverage the staff he has as they field an increasing tide of calls. That tide has reached 15 million calls a year. St. John says he has no idea how many products associates can carry, but any increase over one product for one associate is a gain in productivity.

Meanwhile, Joe Pizzi, vice president of commercial insurance services at Wausau Insurance Cos. in Wausau, Wis., is excited about his vision for merging call centers with HR manage-

ment. Pizzi wants to entice clients that carry worker disability policies to outsource the management of calls from sick employees. Rather than calling in sick to their bosses, employees would call a Wausau call center via a toll-free number. Employees would get a voice-response unit, which Pizzi says is no more impersonal than getting the boss's voice mail when calling in sick at 7:30 a.m. Wausau's computer systems would note the illness, presenting detailed illness reports on individuals or whole companies. Clients could also choose to have voice or electronic notification sent to supervisors and the human resources department. Supervisors would not have to handle the absentee record keeping tasks under the proposed service, which is expected to go live Jan. 1, 1998.

"We are not selling the judge and jury," when it comes to faking illnesses, he says, unless the client wants that, in which case Wausau could accommodate the request. As of last summer, Wausau was lining up customers. —J. Nash





Niall O'Connor called on his IS team to disperse to various business units to improve service.

ator has to speak with an audible smile.

Any failure in the complex of interdependency between staff and system stalls customer service, and that is becoming as horrible a situation as any mechanical snafu on the production line. But even the correct use of technology can throw call centers into a tizzy when unforeseen glitches occur. "If there's a weak link in this chain, the call center will find it," Logan says. To ensure smooth operations, Logan decided to give all development duties for call center systems to Paul

Fusco, vice president of enterprise applications development. Fusco has a team of fellow developers working behind the scenes to "make connections to 10 or 20 different information systems," Logan says. They work directly with their counterparts in the other departments, which relieves them from having to go up and down the corporate hierarchy to make changes that aid call center operators. "[Working directly with counterparts] is relatively new for us," Logan says.

Another consequence of the reorgan-

Web Calls

The marketing department wanted a Web presence and needed IS to deliver a cool site. Now, CIOs are debating the role of the Web in call centers.

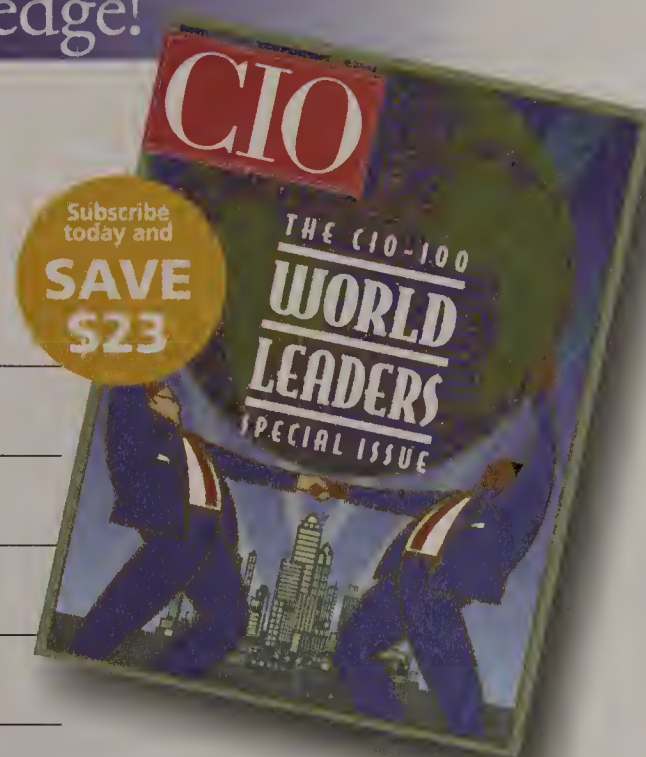
CONTINENTAL Airlines is looking at teleWeb service (see "Click Here for an Agent," Page 36), according to Jeff Ulrich, manager of Continental's OnePass call center. "I think [teleWeb service] would be wonderful. It would be another avenue for customers to contact us," says Ulrich, who started in Continental's telemarketing department as a caller 10 years ago. He readily admits, however, that he's not sure what application would make teleWeb service useful. "If they can overcome the speed issue, then maybe we can find a good use for it."

HFS Inc. is testing a teleWeb concept along with AT&T Corp., says Doug Patterson, executive vice president of telecommunications and call center operations at the travel-company franchiser. But he has some doubt about its usefulness. "I think the Web sites need to be designed so that you don't have to press a button to get assistance," says Patterson. "You're using up two resources right there."

"That sounds like a systems analyst talking," jokes Jim Logan, CIO of Metropolitan Life Insurance Co. "A marketing person would say, 'Wow, they want more information after looking at the Web site? Strike up the band!'" Logan adds: "I'd take [teleWeb] one step further: When it's supportable, I want video." — J. Nash

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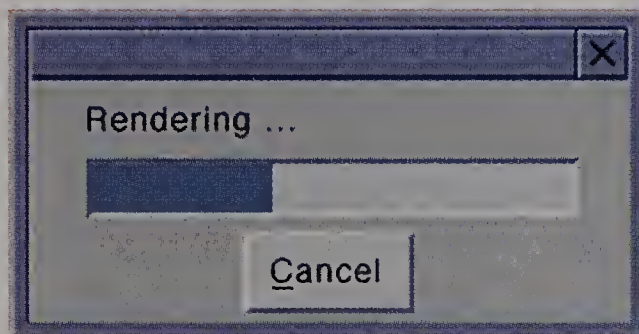
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**How long have you been waiting
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Peter Perialas knows that being a CIO calls for understanding corporate strategy.

ization of call centers at MetLife is the Call Center Workstation (CCW), a two-year-old ongoing project started in early 1996. The CCW is a PC loaded with applications developed by MetLife's IS department. The software makes the user interface easier to navigate and gives call center operators quick access to customer information no matter where that information is stored.

Logan says the CCW project members chose to use object-oriented application development (OOAD) for the CCW

Apple addressed the friction between IS and its internal customers by infiltrating other business units.

rather than traditional client/server software technology because of OOAD's inherent reusability. Object-oriented programming is attractive to CIOs focused on improving call center performance

for this reason. The centers are expected to be the proving ground for new technologies and business strategies for a long time to come. Plugging in software objects can save considerable time and effort compared with rewriting software every time a new technological direction is announced, Logan says. Though MetLife is carefully evaluating the project's success, Logan declines to say how the company will benchmark the CCW's success.

Internal Customers

IN 1994, I.S. EXECUTIVES at Cupertino, Calif.-based Apple Computer Inc. realized they had a customer satisfaction problem. In this case, internal customers were less than "very satisfied." IS managers saw growing friction among IS personnel and employees in other departments—including Apple's vital call center operations. There was no single incident, just the perception that IS could better help its internal customers if its personnel understood the world each business unit inhabits, says Niall O'Connor, Apple's CIO. The ideal would be everyone working together as equal partners, he says. Instead, too often, IS was perceived as an outsider, ignorant of what each department needed in terms of technology deployment. "We found we had technically very bright people [in IS], but they didn't know the business end of things very well," says O'Connor.

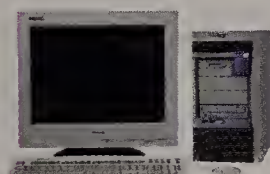
Apple addressed the friction between IS and its internal customers by infiltrating other business units. IS was decentralized to reduce the friction, and a number of IS specialists were assigned to each business unit. For example, 15 specialists devote their time to Apple Assist, the unit that manages the company's outsourced call center operations.

The specialists do the day-to-day computer support of the call centers from inside Apple Assist. IS professionals assigned to Apple Assist now understand the unit's needs because they are there daily rather than only when a new project has been started or troubles arise. "We have [IS] people who know the business unit as well as those in it—sometimes better than some of the people in that unit," he says. "The IS management team had some previous experience where this busi-



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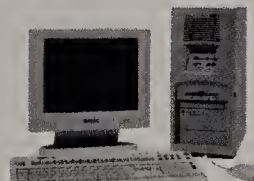
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CALL CENTERS

ness-partnering model worked very well," says O'Connor. "To improve customer service and be more proactive, we moved to this model."

Through Apple's teaming model, IS was able to speed up major technology changeovers for its call center operations. The computer maker switched from Apple Assist's VAX-based information systems, which could not keep pace with call-volume growth, to a new AIX-based system in about a year. "That was aggressive, but we had a pretty good conception of how this business works," says O'Connor. Wholesale hardware changes often take longer than that. But armed with its insider's understanding of Apple Assist operations, IS was able to avoid costly and unforeseen missteps.

To Outsource or Not to Outsource

THE CLASSIC CORPORATE contrarians, executives at Apple feel its call center information systems are a strategic strength, not the operators themselves. On the other hand, Jim Logan at MetLife and execu-

tives at other companies feel they need absolute control over who is saying what to customers. O'Connor says it is more important for him to control the proprietary systems that make telecom contractors more effective and consistent in

Too few people fielding calls causes overtime costs and burnout. Too many people means having to pay people to sit idle.

servicing Apple customers. Other than Vantive Support, call-tracking software from The Vantive Corp., all of the IS equipment and software used in the call tracking area is created by Apple.

It is also less costly to outsource the call center, he says, considering the exaggerated peaks and valleys of call volumes. Too few people fielding calls causes overtime costs and burnout. Too many people in a call center means having to pay people to sit idle.

HFS is carving a middle path in the "to

outsource or not to outsource" debate. Patterson spent much of the beginning of this year negotiating a time-share of sorts with a catalog retailer he declined to name. The high season for car rentals and hotel stays is summer, just when catalog sellers hit their doldrums. The idea is to outsource some of the peak volume to the catalog company. He says a decision should be announced this fall.

Ultimately, MetLife's Logan remains unconvinced that outsourcing is appropriate for a function as critical as customer service. "All kinds of moments of truth happen in those contacts," he says. That could be a chief operating officer talking. Most call centers, in fact, are still almost the exclusive responsibility of COOs.

But that is changing as CIOs continue to see their careers evolve, grow and expand and their impact on their companies widen. Executive Row may never be the same. **CIO**

Jim Nash, an assistant editor at The Chicago Tribune and a freelance technology writer can be reached via e-mail at jimeditor@aol.com.

Where to Buy It *A list of vendors of services and products for call centers*

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Planning to Beat the Band

Robust applications may bring ease of use and multimedia to every desktop, but if bandwidth demands escalate, a whole system can clunk to a halt

BY PETER FABRIS

At halftime every Super Bowl Sunday, while musical acts invade the gridiron amid smoke bombs and laser shows, millions of TV viewers take a respite from cheering for the team they picked in the office betting pool. The midgame break sets the stage for an event that water departments around the country must cope with—the simultaneous use of millions of bathrooms. Waste water department workers put in overtime preparing to maintain adequate water pressure to cope with the dreaded Great National Super Bowl Halftime Flush.

The demands on LANs and WANs during peak periods of usage are like those of metropolitan water systems during the Super Bowl halftime show. Every working day around 1 p.m., for example, when employees return from lunch, they typically fire off several e-mail messages, some of which have lengthy documents attached. That's a lot of bytes flowing through client/server networks simultaneously. Sometimes those peak periods of network usage can bring an otherwise robust network to a crashing halt. As new graphic-rich, data-intensive software comes online faster than CIOs have ever seen, the demand for bandwidth rises constantly. That demand can try even the most level-headed CIO's patience.

Why has bandwidth demand become such a thorny problem? The reasons can be traced to the success of the client/server computing platform. Client/server enables quick responses to

Reader ROI

AS NETWORKS CARRY more complex data, CIOs adopt different strategies to meet new demands. Learn

- ▶ What is driving bandwidth growth
- ▶ How application refinement makes a network run more smoothly
- ▶ How to outsource bandwidth needs

A man with a mustache, wearing a dark suit, white shirt, and a tie with a repeating circular pattern, is smiling at the camera. A large, out-of-focus hand reaches down from the top of the frame towards his head. The background is dark and indistinct.

Mike Kaltenbaugh
*orders up more
bandwidth when-
ever he needs it.*

fast-changing business conditions. IS departments can develop applications with a rapidity unheard of in the days of glass house mainframes. Meanwhile, as IS quickly deploys applications with more sophisticated features, users are becoming better educated about how to use them fully. The

Notes and e-mail over WANs to do that, says Mike Kaltenbaugh, director of enterprise multimedia communications. Better customer service means more knowledge-sharing and collaboration among workers, and that requires bandwidth-hungry client/server applications like Lotus Notes. Combine these demands with heavier use of less sexy applications like e-mail—chock full of spreadsheet, word processing and presentation software attachments—and there's a real danger of overburdening a network. IS managers like Kaltenbaugh have to stay on their toes to prevent that.

And Paul Pansini, director of network systems for Toys 'R Us in Paramus, N.J., says, "My worst fear is not having enough bandwidth to support new applications." Pansini has to keep up with the demands of increased Internet and intranet use, another source of bandwidth demand that IS executives have to contend with these days. The toy retailer is also investigating desktop video as a method for executives and technical engineers in remote locations to stay in touch with each other, another innovation that will boost bandwidth demand considerably, Pansini says.

For companies that do a significant amount of business overseas, information sharing among regional units is paramount. Digital Equipment Corp. increasingly relies on a global intranet and wide area networks over public carriers for completing a host of business processes requiring more sophisticated data sets to careen through WANs, demanding more bandwidth each year. The trend concerns Digital's IS chief. "I'm paying more attention as a CIO to this issue than even a year ago," says Dick

Fishburn, vice president and CIO for the Maynard, Mass., technology company.

Many other CIOs are also paying attention to this trend, according to Tom Nolle, president of CIMI Corp., a networking consulting firm in Voorhees, N.J. A key reason for that is the widespread popularity of intranets. Intranets typically have fast development cycles, as rapid as 60 days, says Nolle. Unfortunately, that sometimes means a network can't be adequately tested for the impact of new intranet applications. "There is often no buildout period where network stability can occur," he says. That drain on bandwidth can slow a previously robust network to a crawl until IS boosts capacity.



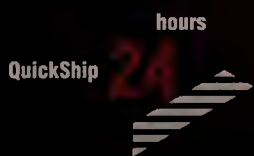
Paul Pansini is toying with desktop video, an innovation that will boost bandwidth demand.

net effect of all these advantages of client/server is that the number of bits floating through networks multiplies as fast as kudzu near a Georgia swamp. That's good news for knowledge workers who need timely information at their fingertips, but it strains the abilities of network managers and CIOs responsible for keeping networks running smoothly.

Customer Needs

At Columbia Gas System, a natural gas utility based in Reston, Va., deregulation has spurred Columbia Gas workers to collaborate more to determine how best to serve the company's 2.1 million customers. They've made more liberal use of voice data, video conferencing and collaborative software such as

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Monitoring Need

Although CIOs can assume that their organizations' bandwidth requirements will continue to rise for the foreseeable future, it's important for them to take the pulse of networks frequently. In fact,

The cost of networking devices is falling as their throughput is rising.

many IS managers monitor bandwidth demand daily in order to figure out where and when bottlenecks occur and take steps to clear them. Client/server networking monitoring tools have improved in recent years, IS managers say, making bandwidth demand vigilance easier than before. Pansini uses Network Health by Concord Communications Inc. of Marlboro, Mass., to monitor bandwidth demand by time and location. He studies reports automatically generated by Network Health to look at overall volume and to determine which nodes are bogging down. From that information he can deduce which applications are overburdening the system and so take steps to alleviate the problem.

Dick Fishburn plans far ahead for expanding bandwidth needs.



Trade-offs

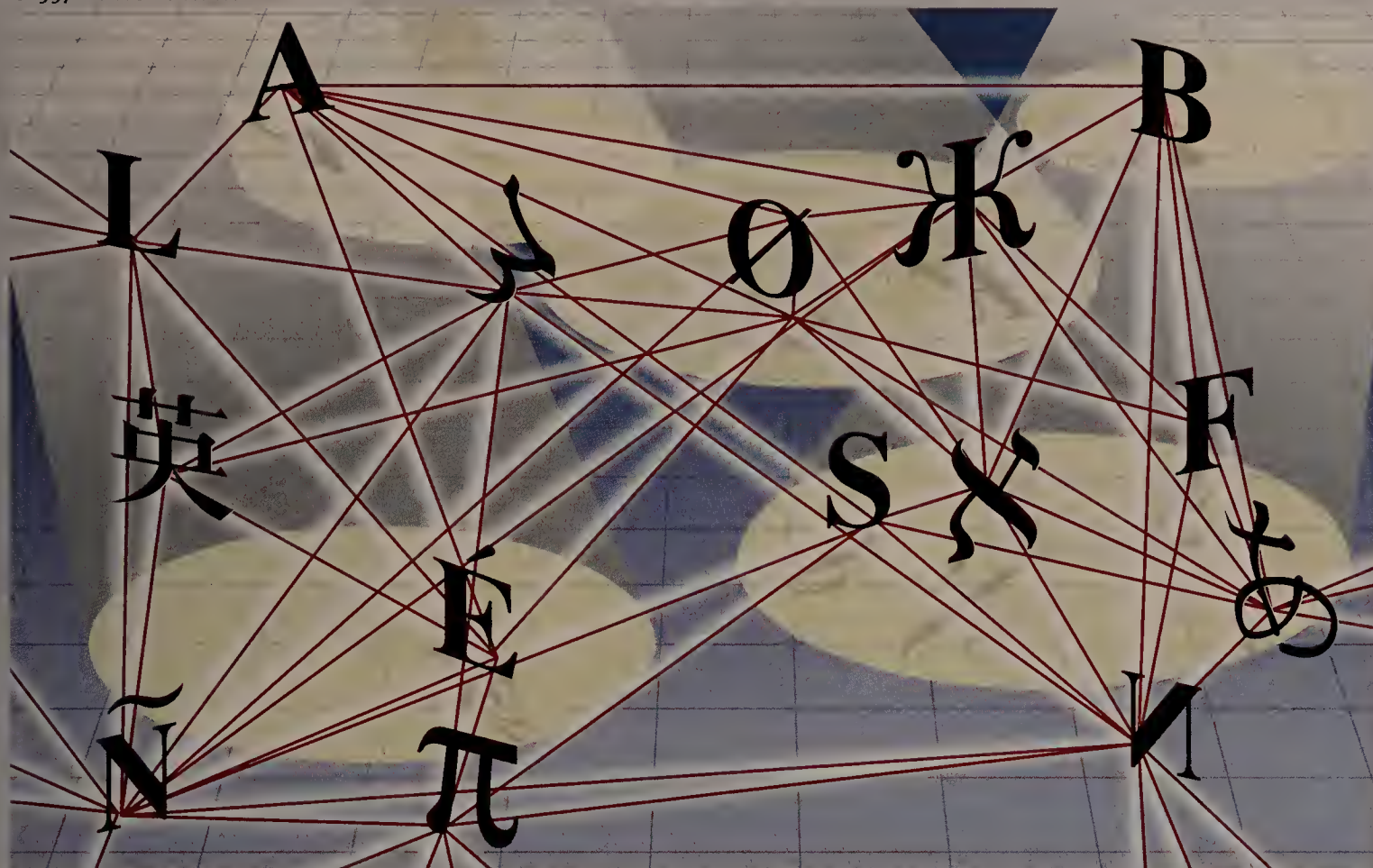
Deciding how to solve a bandwidth crunch always includes a cost-benefit analysis. You might think a CIO for one of the leading networking technology firms such as Cisco Systems Inc. wouldn't have any worries about networking equipment budgets, but that's not really the case, says Peter Solvik, the San Jose, Calif., company's vice president of IS and CIO. Cisco is as bottom-line driven as any other company, he says, so he weighs cost-benefit factors regarding networking investments just as carefully as his counterparts in other industries do. "The network is a business enabler," Solvik says. "You need to manage it and budget for it like any other business-enabling technology." Solvik's staff, like many others, constantly monitors capacity to determine strategically when to upgrade routers and switches. On a day-to-day basis they often make minor systems adjustments to boost performance.

Fortunately, the cost of networking devices is falling as their throughput is rising. That makes it easier and cheaper to stay ahead of bandwidth demands by building more capacity through router and switch upgrades. "The cost of overbuilding—building more than enough capacity to stay ahead of demand—is becoming very modest," CIMI's Nolle says. It typically cost companies about \$500 per seat in the 1980s to build a local area network, he says. Since then, the average cost has fallen to about \$300 per seat while client/server networks have become more robust and reliable.

That said, it's often preferable to look at less expensive solutions when they make sense. At Toys R Us, for example, Pansini sometimes tweaks components of the network enough to increase bandwidth capacity to acceptable levels without incurring the cost of a full-scale upgrade. Like tuning up a car, Pansini periodically adjusts servers, printers and other devices connected to networks to boost overall performance.

Sometimes, though, applications themselves are the source of a networking crunch. Columbia Gas's Kaltenbaugh says, "Network congestion is often driven by poorly designed and improperly operated applications." Though a CIO can massage that problem by tuning software for optimal networking efficiency, it does not mean that IS managers should lust for central management of application selection nor how employees choose to use those applications. "I don't see myself controlling what people can and can't do on the network,"

PHOTO BY JAY REED



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NETWORK INFRASTRUCTURE

Kaltenbaugh says. He does, however, want to make sure that what is being used is operating as efficiently as possible. Software and networking device adjustments can buy time while the company's IS department plans major network upgrades.

When weighing the need for a major networking technology upgrade, Pansini says cost is an important but not the primary consideration. Rather, the key questions are whether a newer technology such as asynchronous transfer mode (ATM) can meet the company's needs and is it the best solution to, say, support videoconferencing? If the answers are yes, you spend the extra money, Pansini says.

WAN Bandwidth

The two major strategies to meet increased bandwidth needs over LANs—tweaking components and upgrading equipment—hold true for WANs as well. But a third option for WANs is to rent bandwidth over T1 and T3 fiber networks built by major

telecommunications providers such as AT&T, MCI Telecommunications Corp. and Sprint Corp. plus a host of smaller, lesser-known companies that provide those services to major metropolitan regions.

Columbia Gas relies heavily on the bandwidth rental option for its WANs. In fact, the company formed a whole new department to focus on that strategy. (See "Mr. Bandwidth," Page 64.) Renting bandwidth is cheaper than building your own WAN both over the short- and long-term. "If I make a \$5 million investment, it's just going to be outdated in a year," Kaltenbaugh says. When telecommunications carriers make that investment, however, they are obligated to continuously upgrade their equipment or risk losing customers. The public carrier is responsible for maintaining service levels. If the network gets bogged down, it's somebody else's fault. Contracts for WAN bandwidth with Bell Atlantic and Ameritech allow the company to use these technologies as much as it wants without constant scrambling to upgrade net-

Peter Solvik weighs cost-benefit factors before expanding bandwidth capabilities.



PHOTO BY KENT HANSON

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Mr. Bandwidth

At Columbia Gas, keeping the pipelines clear is a special job

"I'M NOT AN I.T. GUY nor a technician," says Mike Kaltenbaugh, yet as director of enterprise multi-media communications for Columbia Gas System, he keeps the company's vital technology backbone running. Kaltenbaugh's unique title reflects an unusual position within the company. Kaltenbaugh reports to the senior vice president of Columbia's service company who in turn reports directly to the board. "We made a conscious decision for my position to not report to the CIO," he says. Instead of reporting to IS, IS is one of Kaltenbaugh's largest customers. That arrangement prevents him from battling directly with the CIO for IT dollars.

Kaltenbaugh's main responsibility is to get the best price and service from public telecommunications carriers to support the Reston, Va., natural gas utility's heavy use of wide area networks. Kaltenbaugh, who was a telecommunications consultant for the utility before his appointment to a full-time position in August 1996, says his biggest challenge is to make sure the company's WANs can support increasingly heavy data traffic levels. "I'm like the planning and zoning commission," he says. "I have to make sure the road is there."

That road has led to more knowledge sharing among workers, which, in turn, Kaltenbaugh says, has allowed the company to thrive. Sharing information—customer data between sales and service departments, for instance—has become so important to Columbia after the natural gas industry was deregulated that it formed a new department—Kaltenbaugh's—to manage wide area networks. "Communication can be a catalyst for cultural change,"

Kaltenbaugh notes, and Columbia's culture certainly has changed. There's been "an explosion" in the consumption of communication services, he says. Witness the popularity of the company's intranet, receiving hundreds of thousands of hits a month.

Kaltenbaugh isn't shy about angling for the best deal from telecommunications providers. For example, he's inserted a provision in one contract to hold the provider accountable if the provider is late in arranging new circuits between sites. So if Kaltenbaugh seeks a new circuit between headquarters and an outlying office, if the carrier agrees to provide one in 10 days and it takes 11, then the provider must waive its setup fees.

It takes a tough negotiator to set up a provision like that and Kaltenbaugh may save some money as a result, but his primary objective remains to obtain high-quality service. Kaltenbaugh measures "congested seconds" and dropped packets to gauge service quality. "The service has to be as reliable as a dial tone," he says. But Kaltenbaugh emphasizes that he doesn't want to alienate his providers when things go awry. "If I treat my service providers as adversaries, I'm going to get adversarial service," he says. After all, he reasons, the real bull's eye is not to reduce a telecommunications outsourcing budget line item, but rather to provide a means for workers to collaborate to better serve customers."

—P. Fabris



Mr. Bandwidth is Mike Kaltenbaugh.

works. When there is need, Kaltenbaugh orders more bandwidth from his providers. "It's a classic outsourcing situation," he says.

Digital, which earns more revenue from overseas markets than from domestic ones, also relies heavily on public carriers for its WAN needs. Digital's corporate structure demands that workers frequently share information across international borders. "We have become global and work more cross-functionally," says Fishburn.

Digital's corporate structure requires that the company send bandwidth-hungry files across borders to complete routine operations and to hone worldwide business unit strategy. Digital's finance personnel in Europe, for example, must work with their counterparts at corporate headquarters in Maynard to close the books every month; in the

past, they reconciled their own regional earnings and sent reports to the home office. Using public carriers for WANs makes it easier for IS to support Digital's organizational approach. Like Columbia Gas, when bandwidth demand rises, Digital's IS staff doesn't have to upgrade or rebuild a network. They simply purchase more capacity from MCI, AT&T or British Telecom and let the bits fly across borders. "We've moved the technological risk from us as a user to the telecommunications providers," Fishburn says.

What Lies Ahead?

Today IS managers struggle to keep their networks robust enough to handle applications that are ravenous for bandwidth. But what about the future? Will bandwidth demand continue to rise?

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Are there technologies on the horizon that will make IS managers' lives less harried in this respect?

One thing is certain: Internet and intranet use will continue to increase. "You're going to have TCP/IP to every desktop," says Nolle. That means higher bandwidth demand across LANs and WANs. The use of desktop video will continue to expand as well, Nolle predicts, forcing some CIOs to upgrade networking technology corporatewide. For a small percentage of workers, that will mean

Hang on, there is hope over the long term. Tools will catch up to technology innovations.

ATM to the desktop. However, Nolle contends, it's unrealistic to expect that ATM will be deployed on a large scale because it costs too much.

Rather, Nolle envisions an elite class of decision makers, mostly upper-level executives, making the most use of multimedia tools such as desktop video. They'll require ATM to the desktop to use those tools, while lower-level workers will make due with Ethernet or Fast Ethernet.

Another factor that will drive increased bandwidth demand over WANs is the trend toward more telecommuting and the use of technology such as sales force automation. Remote workers demand access to the same information as their colleagues in corporate headquarters—access via WANs to e-mail, groupware and databases. By 2002, about 54 million workers in the United States will access corporate networks from remote locations, predicts John Girard, research analyst for the Gartner Group. IS managers will have to ensure that those workers can get reliable access to the information they need. Network monitoring tools will continue to evolve, offer richer features and become more sophisticated, Nolle says. Unfortunately, that doesn't mean that the lives of those who are in charge of managing networks are going to get easier in the foreseeable future. "Networks are changing faster than the tools are," Nolle says. His advice to harried network managers: Hang on, there is hope over the longer term. Tools will catch up to technology innovations.

Another promising development is a new technology called multicasting (see "Does Multicasting Make Sense?" Page 80) which might provide a cost-effective way to squeeze more bandwidth out of networks. Multicasting allows routers to copy data packets to more than one path at a time, unlike the conventional method in which every packet that

Challenges

- Client/server applications such as groupware and presentation software have become more sophisticated, requiring more bandwidth.
- Users have become better educated and tend to make full use of software features such as the lengthy document attachments to e-mail messages.
- Faster development cycles on client/server applications—60 days for intranets, for example—mean applications go online faster, straining networks further.
- Periods of usage spikes caused by heavy e-mail traffic—after lunch, for example—can make it difficult to gauge bandwidth needs accurately.
- More telecommuters and remote salespeople and the need for workers to share information across national borders raise bandwidth demand over wide area networks.
- Network upgrade costs aren't always matched by equivalent business benefits.

Strategies

- Build more capacity by upgrading routers and switches. The cost of networking devices has dropped as their throughput has increased, making upgrading more cost effective.
- Consider newer technologies, such as ATM, that provide higher bandwidth.
- Buy more bandwidth to support wide area networks from public telecommunications providers.
- Investigate cutting-edge solutions such as multicasting. —P. Fabris

leaves a server goes to only one client.

If bandwidth demands continue to grow at this pace, CIOs can continue to expect bandwidth demands that rival Super Bowl halftime water problems. But they will have an easier time coping as client/server networking tools and technology mature to take the pressure off and make the pipelines wider. **CIO**

Staff Writer Peter Fabris can be reached via e-mail at pfabris@cio.com.



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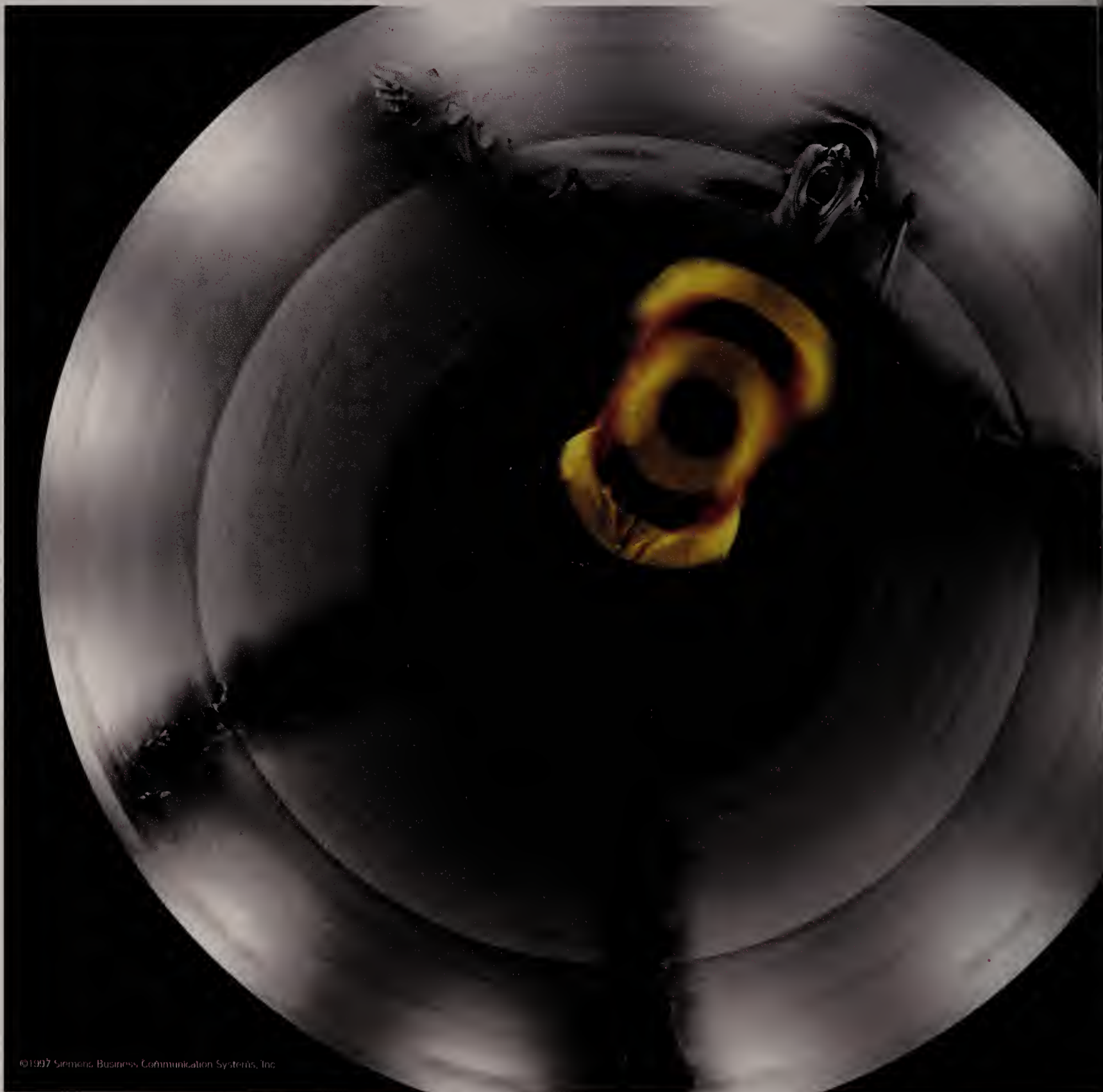


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The Future Is Coming To Us.

Minding

How do grocery retailers keep customers happy while stamping out waste and inefficiency? Depends where they are. In the United States and the United Kingdom, the answer can be very different. Efficient consumer response may—or may not—be a part.

BY MALCOLM WHEATLEY

WHEN JOHN BULL takes his groceries through a checkout line at Tesco PLC, Britain's biggest grocery retailer, he doesn't just replenish his own supplies. His purchases also directly trigger their own replenishment at Tesco. For each of the company's 578 stores in the United Kingdom, electronic point-of-sale data is adjusted to take account of known weather, seasonal and promotional factors to generate a replenishment order that appears on suppliers' computer systems via EDI links. In some cases, "we're talking just hours of lead time," says Graham Booth, supply chain development director for the chain based in Cheshunt, Hertfordshire, England. "Three or four days of lead time is very common."



the Stores



Reader ROI

DESPITE CLEAR BENEFITS for U.S. grocery retailers, manufacturers and consumers, efficient consumer response (ECR) has been slow to deliver on its early promise in the United States. In the United Kingdom, on the other hand, it has been much more successful. This article will show you why and offer some object lessons for U.S. grocery retailers.

On the other hand, when Bull's U.S. cousin John Doe purchases a similar basket of goods, slick ordering systems such as Tesco's—and the resulting low levels of inventory and high levels of stock availability—remain a dream, one pursued by the U.S. grocery industry under the banner of efficient consumer response (ECR). Based on the premise that manufacturers and retailers could work more closely together to benefit both the end consumer and their own individual bottom lines, ECR is a collection of optimization methodologies that first started to sweep through the industry in 1993, seeking to improve the lot of consumers, retailers and manufacturers with a four-pronged attack on waste and inefficiency.

Specifically, ECR is aimed at achieving slicker product replenishment, improved category management, better-managed promotions and a more efficient approach to introducing new products. Each of these broad attacks is bolstered by a dozen or so subsidiary initiatives or enabling technologies—continuous replenishment of product (CRP), EDI, activity-based costing, cross-docking, electronic funds transfer, synchronized production, automated ordering systems (AOS) and so forth. ECR is loosely modeled on Japanese-inspired practices in the automotive industry, where—in addition to participating in joint programs to share data and cut costs—suppliers of automotive components have become used to delivering to vehicle manufacturers' assembly lines every few hours. Despite the hype, however, ECR's goals have not been realized in the United States, and the U.K. grocery industry, which initially gave ECR only a lukewarm welcome, remains way ahead of its U.S. counterpart.

U.S. retailers are much more likely to identify with Shaw's Supermarkets Inc.,

EFFICIENT CONSUMER RESPONSE

based in East Bridgewater, Mass., than with Tesco. The company's ECR efforts have eschewed slick reordering systems in favor of activity-based costing in order to identify the most efficient means of distributing bulky but low-value items such as bottled water, chips and juices, according to Paul Gannon, the company's senior vice president of finance and administrative systems. This, he explains, has led to a "reemphasis on direct-to-store deliveries by suppliers"—with a provable financial benefit. Although Gannon acknowledges that some manufacturers, such as Procter & Gamble, have discount systems that reward low-cost and efficient retailers that send their orders via EDI, Shaw's appears to be considerably far away from the sophisticated systems favored by U.K. retailers. An AOS has been in place for

annual ECR conference in March 1997. "If this industry wants people to believe that ECR is important, we can only hope that next year the front row of the conference will be filled with the industry's movers and shakers," it charged.

Not that ECR has been a total flop. Grocery retailers across the country as well as manufacturers such as Procter & Gamble happily point to the benefits of CRP, a technique whereby suppliers electronically monitor inventory levels on retailers' shelves and send replacements as stock reaches predetermined replenishment points. Excess inventory has been taken out of the pipeline, underused warehouses have been shut down and EDI is gradually replacing much of the paper in the industry's supply chains (see "Turn, Turn, Turn," *CIO*, May 1, 1996).

"showing us how to focus on selling and not buying," the retail chain's four-year partnership with the Coca-Cola Co. had boosted dollar sales of soft drinks by 68 percent and case-denominated sales by 28 percent, claimed Wegman in the May 12, 1997, issue of *Supermarket News*.

IN EUROPE, AND especially the United Kingdom, ECR has proceeded along rather different lines—lines that reveal a number of object lessons for the U.S. grocery industry. "Inventory just isn't the issue," say Glennie Gibson, retail director at CSC's U.K. offices, based in Farnborough. "The focus is much more on growing the category—demand generation, in other words—than it is on eliminating costs or inventory."



“Although we’re now starting to find real examples of **cost** savings that are attributable to ECR, we’re nowhere near achieving the **predicted adoption** and benefits curve.” —Gary Ring

some years, he explains, but it has only recently been extended to incorporate EDI, and apart from a limited trial with a third-party wholesaler covering just 15 of the company's 150 stores, it will not be extended to other suppliers until early next year. ECR has suffered from "some overly optimistic timetables," he says, "although reality has now set in. The benefits will take longer to achieve than people assumed."

It's an opinion that seems to be widely shared. An article in the April 1997 issue of *Progressive Grocer* testily noted that "the perceived benefits of ECR have failed to trickle down through the industry, leaving plenty of questions about its effectiveness." The following month, an article in the same magazine commented acidly on the absence or token appearances of senior executives of ECR-sponsoring organizations at the grocery industry's Joint Industry Committee's third

Compared with the hoopla that accompanied ECR's initial introduction, though, the bottom-line benefits to date have a distinct taste of small beer. "Although we're now starting to find real examples of definitive cost savings that are attributable to ECR, we're nowhere near achieving the predicted adoption and benefits curve," notes Gary Ring, an Atlanta-based senior consultant in the retail systems group of computer and database manufacturer NCR Corp.

Having acknowledged that ECR had hitherto focused almost exclusively on replenishment, Daniel Wegman, co-chair of the grocery industry's Joint Industry Committee on ECR and president of the Rochester, N.Y.-based Wegmans Food Markets Inc., encouraged fellow retailers attending the annual Food Marketing Institute convention in May 1997 to broaden the focus of their efforts with an example from his own company. By

When ECR first emerged, "the average number of days of inventory in U.S. food retailers' supply chains was more than twice the average level of inventory in European food retailers' supply chains," notes Alan Waller, senior partner of logistics in the London office of consultancy Coopers & Lybrand. Consequently, he adds, many European retailers were reluctant to embrace ECR.

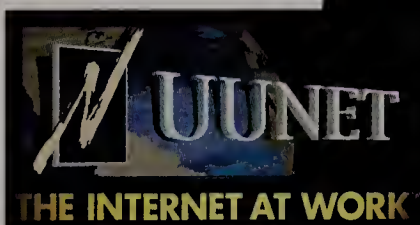
Somerfield Stores Ltd. is a Bristol, England-based retailer whose sales of \$5.5 billion rank it number five in the U.K. grocery industry, according to Nielsen Homescan, a market research company in Headington, Oxford. Supply chain executive Sarah Pennington points to the success of a two-year-old trial program aimed at actively involving six suppliers in the replenishment process—not necessarily with a view solely to eliminate inventory but to improve the products' overall availability and range mix

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through sharing information and striving to create a better commercial relationship. But while ECR proponents hype vendor-managed inventories (VMI), Somerfield opted for a policy of co-managed inventories (CMI). "We made an important distinction between CMI and VMI," Pennington explains. "We thought that two of us together could do it better than either party on their own."

The experience has shown that getting stuck in and "doing something tangible

is better than just talking about it," she says. The trial program has shown that parameters such as participating suppliers' product service levels and inventory performance rose right across the company's stores, and not just in those that were directly involved in the trial program. The result is proof, Pennington asserts, "that it wasn't just the ordering responsibility that made the difference but the shared information and the improved nature of the relationship."

U.S. retailers' average of around 70 days' worth of sales in the inventory pipeline contrasts sharply with European retailers' 30 days. And whereas U.S. performance clusters fairly closely around the average, the degree of divergence is much greater in Europe. Tesco, for instance, recognized early on in its evaluation of ECR that with a pipeline inventory that was already under 15 days' worth of sales—as opposed to U.S. retailers' goal of four weeks' worth—slicker inventory management techniques probably had little to offer the company. And J. Sainsbury PLC, the U.K.'s number-two grocery retailer—with a comparable supply chain performance—was even more dismissive. In July 1995, a spokesperson explained to British business magazine *Management Today* that although the company was aware of ECR, it "doesn't use it, has no plans to use it and feels its own systems to be superior."

Hubris? Apparently not. A year later, when a Europe-wide working party—the European ECR Executive Board, co-chaired by senior executives from Johnson & Johnson and Tesco and including representatives from manufacturers such as Mars Inc., Coca-Cola and Procter & Gamble as well as retailers such as Tesco, Promodès of France and Albert Heijn Supermarkets of the Netherlands—published a report on the applicability of ECR in Europe, inventory reductions were indeed found to be a minor part of the overall possible improvement. Only some 0.9 percentage points of the estimated 5.7 percent, or \$33 billion per year, total reduction in supply chain cost could be attributed to the elimination of inventory. By contrast, an earlier study on ECR's likely effectiveness in the U.S. grocery industry by Atlanta-based consultancy Kurt Salmon Associates, which served a similar pump-priming purpose in getting the ECR initiative underway, found that inventory elimination offered significantly higher savings in the United States. Not only were the overall savings greater (10.8 percent of supply chain costs), but the study also found that the proportion of that associated with inventory reduction was also greater. A saving of 2.6 percentage points, it estimated, was attributable to "financial costs," including an element for a reduction in fixed assets.

Tesco, according to Booth, reckons that it can take \$161 million out of its supply

The Law of the Land

One reason ECR has played out so differently in the United States and the United Kingdom may be something that can't be helped: the prevailing legal restrictions

A“AMERICAN RETAILERS NEED TO BE MORE LIKE British retailers,” asserts Peter Harding, global vice president of marketing for Kurt Salmon Associates in New York. Unfortunately, their ability to do so may lie beyond not only their own capability to transform themselves but that of the entire manufacturer-retailer supply chain partnership that underpins ECR. The problem? Antitrust law. And as the spat between Europe and the United States over the merger of The Boeing Co. and McDonnell Douglas shows, Europe's antitrust legislators are prone to take a different view of antitrust matters.

As Harding points out, U.S. antitrust laws dictate that certain subjects—such as product promotions or price—cannot be discussed or worked on collaboratively. As a result, he says, most of the U.S. work on ECR has concentrated on category management and inventory reduction. Equally promising avenues toward improved product launches and better product promotions have been blocked off. “In the U.S., manufacturers cannot offer significantly lower prices to big customers unless they can be justified by genuine cost savings,” Harding explains. In the United Kingdom, anything goes.

Malcolm Schwartz, the New York-based partner who heads Coopers & Lybrand's consumer products industry practice, explains that intercompany discussions of ECR become cramped by legal restrictions. “Every time [the ECR] committee meets, the lawyers have to ensure that no discussion encroaches into collusion.” Chairmen simply cut off certain lines of debate, it seems, ruling that such questions cannot legally be debated. Inevitably, given the level of collaboration that ECR calls for, this limitation cramps its progress. Some might call it ironic, given that antitrust laws are there to protect the consumer but in this instance seem to be impeding work to benefit the consumer. But at least the problem has been recognized. According to a report in the March 10, 1997, issue of *Supermarket News*, work is underway to address the issue, “and the industry will see results.” The question is, When?

—M. Wheatley

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chain cost base over the next four years, principally through further enhancements to its reordering system, category management and better handling techniques at its distribution centers and stores. With the first of those years almost complete, he says, progress has been good. Crucially, though, he stresses that Tesco "made a conscious decision not to change our terminology but to incorporate ECR concepts within the Tesco language." ECR is much more than inventory reduction, he adds. "There are massive opportunities in cost elimination, quality improvement and range management."

WHY THE SHARP differences between the United States and Britain? Differences in antitrust legislation are part of the answer (see "The Law of the Land," Page 74). But there are also other differences, such as industry concentration. Although he cautions that there are differences among individual European countries—the retail industry in Germany, for instance, is closer to the U.S. model than it is to that of the United

already have more than 45 percent market share and are striving for more. In the U.S., where retailing is mostly regionally based, even the largest retailer has just over 5 percent of the market."

Apart from the degree of concentration, another important difference is the degree to which a retailer's "own-label" products occupy its shelves. Most of the U.K.'s top five retailers, for example, have own-label shares in excess of 40 percent of their total product range. At J. Sainsbury, the proportion is two-thirds, and the chain's strategy of pitching its own-label products as premium products in their own right is being widely copied throughout Europe. With rare exceptions, producers of branded products avoid the business of own-label manufacture, leaving it to smaller-niche players. Once again, the result is a balance of power between retailer and manufacturer that in most cases leads the manufacturer to dance to the retailer's tune. You want us to deliver every day? No problem.

Combine these two structural aspects of the industry, and European retailers'

have deployed handheld terminals among the clerks who stock the shelves, "there's very little forecasting that takes place and a lot of pipeline inventory that's there just in case it's needed."

But there's more to using point-of-sale data than simply making investments in the appropriate technology. Once again, the industry's degree of concentration and the balance of power between retailers and manufacturers have a huge bearing on the effectiveness of intercompany transactions. Charles R. Troyer, a partner in the national consumer goods and retail practice with CSC Consulting's New York office and one of ECR's founding fathers, points to bar coding as an example of an issue that is holding up ECR and the improvement of supply chain efficiency in the food service industry. "Generally speaking, the greatest beneficiaries of bar coding are the receivers of products and those using the products," says Troyer. "For manufacturers, there aren't many benefits, but that's where the cost and much of the investment occurs."

Tesco reckons that it can take **\$161** million out of its supply chain cost base over the next four years, principally through further enhancements to its **reordering** systems, category

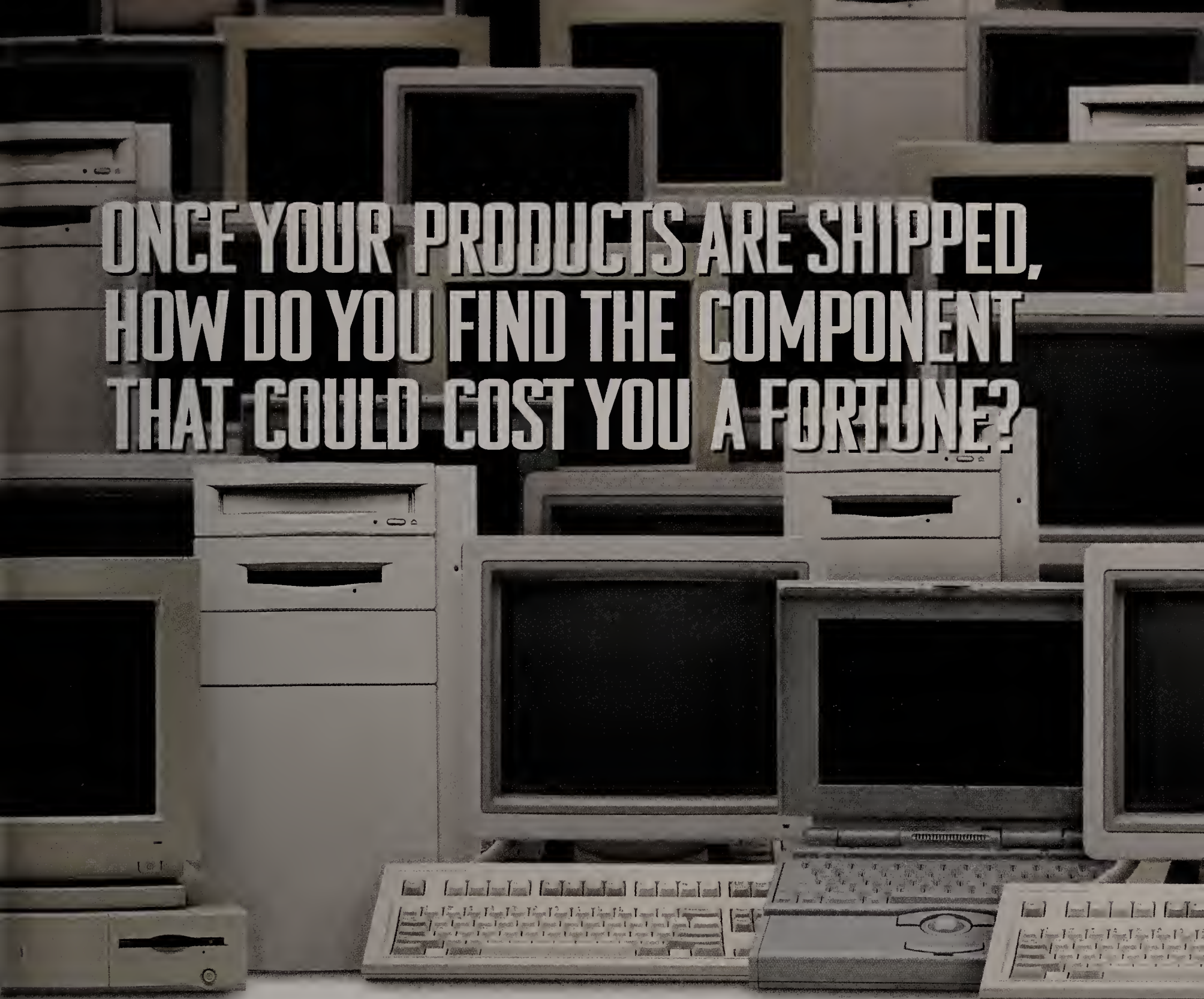
Kingdom—David Henderson, a partner in the London office of Price Waterhouse Management Consulting and leader of its European Consumer Packaged Goods practice, points out that the level of concentration, or the proportion of the market dominated by a few players, in the retail industry has had a major influence on the extent to which retailers can pursue ECR-led efficiencies. When it comes to bargaining with giants such as Unilever PLC, Procter & Gamble and Kraft Jacobs Suchard, size matters. "There's a huge imbalance of power between manufacturers and retailers," Henderson says. "The top five European grocery retailers

management and better handling techniques.

lack of interest in some of the hype surrounding ECR concepts that has so gripped their American counterparts becomes understandable. "Companies such as Tesco have been very aggressive in using point-of-sale data to drive replenishment," says Peter Harding, global vice president of marketing for Kurt Salmon Associates in New York. "In the U.S., the act of a consumer's purchase does not trigger a matching replenishment action." While some retailers

Similarly, he reckons, ECR's CRP and VMI initiatives have been hit by the industry's inability to share the benefits equitably. "When you look at these things from the perspective of one partner, it's often a losing proposition. A retailer might gain a benefit of \$1 per case, at a cost to the supplier of 50 cents a case. Overall, the supply chain gains 50 cents, but the manufacturer says it isn't a going proposition because their cost has increased."





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In Europe, because higher levels of industry concentration saw such battles fought long before the advent of ECR, the issue has proved much less of a distraction. From the standpoint of the U.S. industry's current degree of concentration, surmounting the hurdle may well call for some tricky footwork. And if manufacturers can't charge extra per case, Troyer says that the best bet may be using ECR to match initiatives between partners: offsetting the CRP/VMI cost imbalance, for example, with "another initiative, such as EDI, that calls for the retailer to increase its cost by 50 cents in order to save the manufacturer \$1."

Even so, observers such as David Sharpe, a Manchester, England-based associate partner in Andersen Consulting's retail practice, say that U.S. retailers need to polish some of their management disciplines if they are to achieve the levels of supply chain efficiency seen in Europe. "U.K. retailers have much higher levels of data accuracy," he asserts, citing figures that suggest a typical inventory accuracy

ers still given incentives to make bulk buys that bloat the inventory pipeline even more. "What winds up in the store often tends to be what looked like a good buy rather than being what the consumer wanted," according to Kurt Salmon's Harding. One U.S. retailer's recent baby food promotion was so successful, he notes, that "the promotion sold four times the amount that had been forecast, with the balance all coming out of pipeline inventory—something that couldn't have happened in the U.K."

The implication is that U.S. retailers need to get their forecasts right and back their judgment with specially procured inventory. What's more, says Harding, too many U.S. retailers still inefficiently manage buyers by manufacturer rather than product category, "with the result that a single buyer might buy detergents, paper towels and orange juice because they come from a single manufacturer."

Consulting's consumer products industry practice. As a consequence, buyers will have to focus much more on the products that consumers genuinely want, marketers will have to identify which products they are—rather than simply filling shelves with a scattershot approach to the category management—and CIOs will have to work harder to capture and share the information required to achieve this. "A lot of information that is unnecessary in terms of performing a transaction is vital when it comes to monitoring and optimizing [sales performance]," says Schwartz. "Retailers will need to know things such as who purchased which product, when they purchased it, how they paid for it and which items they purchased alongside it. More to the point, so will manufacturers."

Frequent shopper cards, a fast-growing phenomenon on both sides of the

On both sides of the **Atlantic**,
ECR proponents are coming to recognize that instead
of arguing about how best to divvy up the pie, a better
strategy is to **increase its size.**

level of 90 percent in the United Kingdom and 80 percent in the United States.

To blame are practices such as dumping nonscannable items to a generic code "so that all you know is the price." Such practices are far less prevalent in the United Kingdom and thus degrade data to a much lesser extent. Simple observation at U.S. checkout registers shows the extent to which U.S. retailers need to address cashiers' levels of discipline, says Sharpe, noting that "it's too tempting for [U.S. checkout clerks] to see 24 tins of cat food at the same price, scan one and press the button to indicate that there are 24 cans," he explains. "The fact that they are different flavors—chicken, rabbit, tuna or whatever—gets overlooked."

U.S. retailers, it seems, are also still overly focused on outmoded and inefficient buying practices, with many buy-

Ironically, the spur to address this particular issue—and provide a welcome filip to the ECR initiative as a whole—may come from a hitherto almost unregarded aspect of ECR: category management. On both sides of the Atlantic, ECR proponents are coming to recognize that instead of arguing about how best to divvy up the pie, a better strategy is to increase its size. "ECR is an important collaborative initiative in our industry—and for us, category management is a big part of it," says Girard Liberty, director of information services at Welch's, a Boston-based food and beverage manufacturer and marketer.

Indeed, "in the last few months, the stress has very much been on the C word," for category, agrees Malcolm Schwartz, the New York-based partner who heads Coopers & Lybrand

Atlantic, help provide such information, although retailers still want to hold on to as much of the data as possible. But the holdout may not last much longer: The prizes have enough glitter to assuage the doubts of even the most intransigent retailer. A recent trial of category management techniques by Procter & Gamble, reported in the May 17, 1997, issue of *The Economist*, noted that the company had seen sales rise by 6 percent and profits by 22 percent after reducing the range on the shelf by 13 percent.

Retailing insiders are nodding knowledgeably: There's a lot more of this on the way, predicts Schwartz. If so, it could act to break the ECR logjam. **CIO**

Malcolm Wheatley, a United Kingdom-based freelance writer, can be reached at malcolm_wheatley@compuserve.com.

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Edited by Elaine M. Cummings

Does Multicasting Make Sense?

Continuous data streams could make networks cheaper and stronger

BY FRED HAPGOOD

FOR YEARS NOW, engineers have been saying that in concept radical, even revolutionary, improvements in network performance could be achieved with a simple fix: by allowing routers to copy packets to more than one path at a time.

Now, every packet that leaves a server goes to one client only. If a thousand other users want copies of that packet as it travels by their connections, too bad. That's not the way a network works. Instead, every one of those thousand users has to send a separate query to the originating server, which then has to send each user his or her own copy of the requested packet.

The cost of this enormous redundancy is felt first in time wasted waiting for responses from overburdened servers, then by managers forced to buy unnecessary hardware and bandwidth to assure a given service level and finally by entrepreneurs in the loss of potentially lucrative applications.

The solution is a multicast-enabled network that allows routers to copy packets to several paths at once.

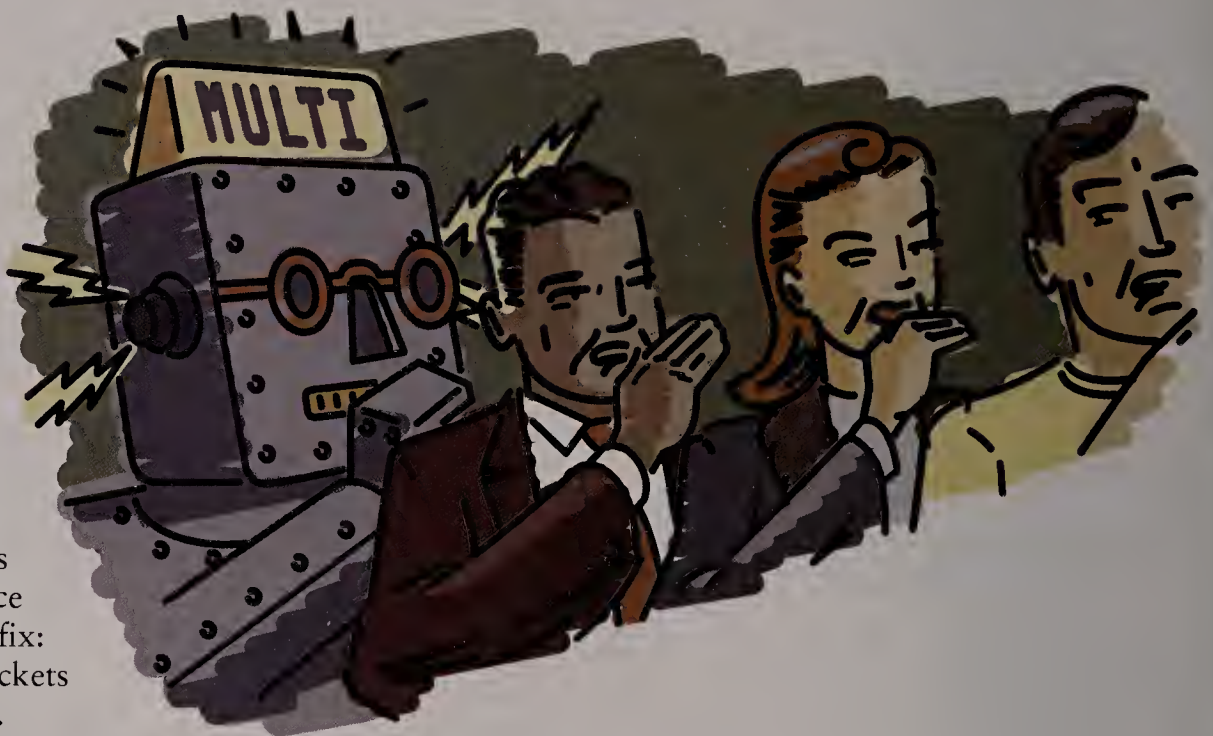
With multicasting, a single server could simultaneously send a continuous data stream to tens of millions of desktops with no delay; as a result, networks would be so much cheaper and more powerful as to be unrecognizable.

Researchers attracted by that logic began work on multicast networks in the 1980s, and the first

multicast session was conducted by Stanford University in 1988. By 1992, research had advanced far enough to allow the Internet Engineering Task Force to define and publish a set of multicast network standards. They were used to set up the Multicast Backbone (MBONE), a composite unicast/multicast network running on the Internet. The MBONE had its first moment of fame in 1993, when it carried a Rolling Stones concert.

By 1995, networking equipment companies Cisco Systems Inc. and Lucent Technologies Inc. began selling routers and switches that supported multicasting, and a year later applications relying on multicast networks started to appear on the market.

But as the salespeople behind these applications began knocking on doors, they made a distressing discovery: As clear-cut as the advantages of the mode were in theory, network managers were just not turning multicast on. "There was just no awareness," says Judy Estrin, president of Precept Software Inc. in Cupertino, Calif., whose product, IP/TV, carries streaming video and audio over intranets. "Customers didn't know multicasting was available, or if they did, they didn't understand the benefits of it. They hadn't been connecting multicasting to their needs."



IN THIS SECTION

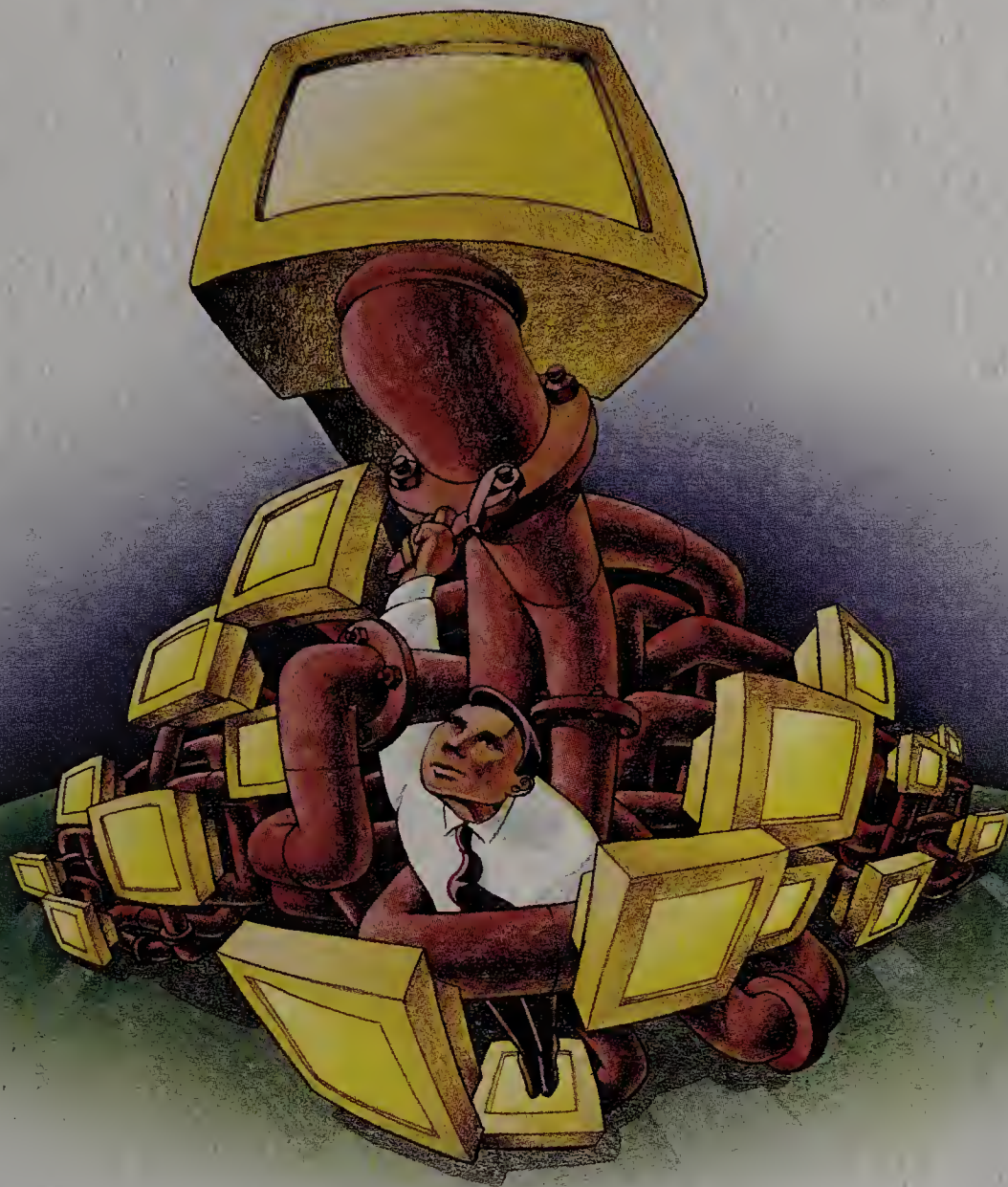
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Emerging Technology

Network managers, it seems, had reasons to leave multicast unexplored. "IP multicasting is like nuclear power," says John Tavs, systems manager for TCP/IP at IBM Corp. "A slight configuration error can trigger a massive traffic flood. Some companies have lost their whole network for days," he explains. "Managers are going to be cautious about turning it on in the absence of a mandate."

Estrin reacted by helping organize the IP Multicast Initiative, an association of vendors (including such serious players as AT&T Corp., IBM, Intel Corp., Microsoft Corp., Hewlett-Packard Co., Xerox Corp. and Digital Equipment Corp.) that distributes information about the market, applications and management of the technology. (For more details, check out Precept's Web site at www.precept.com.)

The core of the case made by the initiative covers three points. One, suites of applications that include multimedia, push technologies, large-scale collaborations, software upgrades to very large installed bases, real-time high-bandwidth distributed database updates, and networks of proxying, mirroring and caching sites will exceed the

"With multicasting, these data storms are a lot less severe because the first resend operation is so much more efficient."

—John Donovan

capacities of unicast no matter how fast unicast develops. Two, delivery constituencies are growing, reaching tens of thousands of desktops on the corporate intranet and then spreading beyond these walls to include business partners. The larger the pools, the stronger the

Single, and Loving It

The promise of one sign-on will make life safer and easier—at least for users

LOGGING IN AND THEN navigating from one application to another might seem to some users like having a friend with amnesia—"Who did you say you were, again?" the computer asks her as she patiently supplies yet another user ID and password. One worker from a phone company, whose job requires that he touch lots of operational systems, complains of having more than 150 different user IDs and

happier, administrators' jobs easier and security tighter (at least insofar as those pesky passwords aren't left in plain view).

But what's being touted as single sign-on might not live up to its hype as far as the security administrator is concerned. An administrator changes permissions for a user three times, says William Malik, vice president

SINGLE SIGN-ON

and research director at Gartner Group Inc. in Stamford, Conn.:

when an employee is hired, when he quits and when he takes on a new role within the company. "In the case of the last one, it's not just a delete and an add," says Malik. "Some access rights continue, others might be added, still others are given only after training," he says.

"It takes more maintenance than just throwing a switch."

In companies where procedures are well defined, it's easier to get from A to B in a smooth fashion. A division of Motorola Inc., famous for its Six Sigma quality efforts, reports that within 15 minutes of a payroll change, it has correctly modified a file. But most of us don't live in such procedurally well-defined environments. "If you automate a mess, you've still got a mess," says Malik.

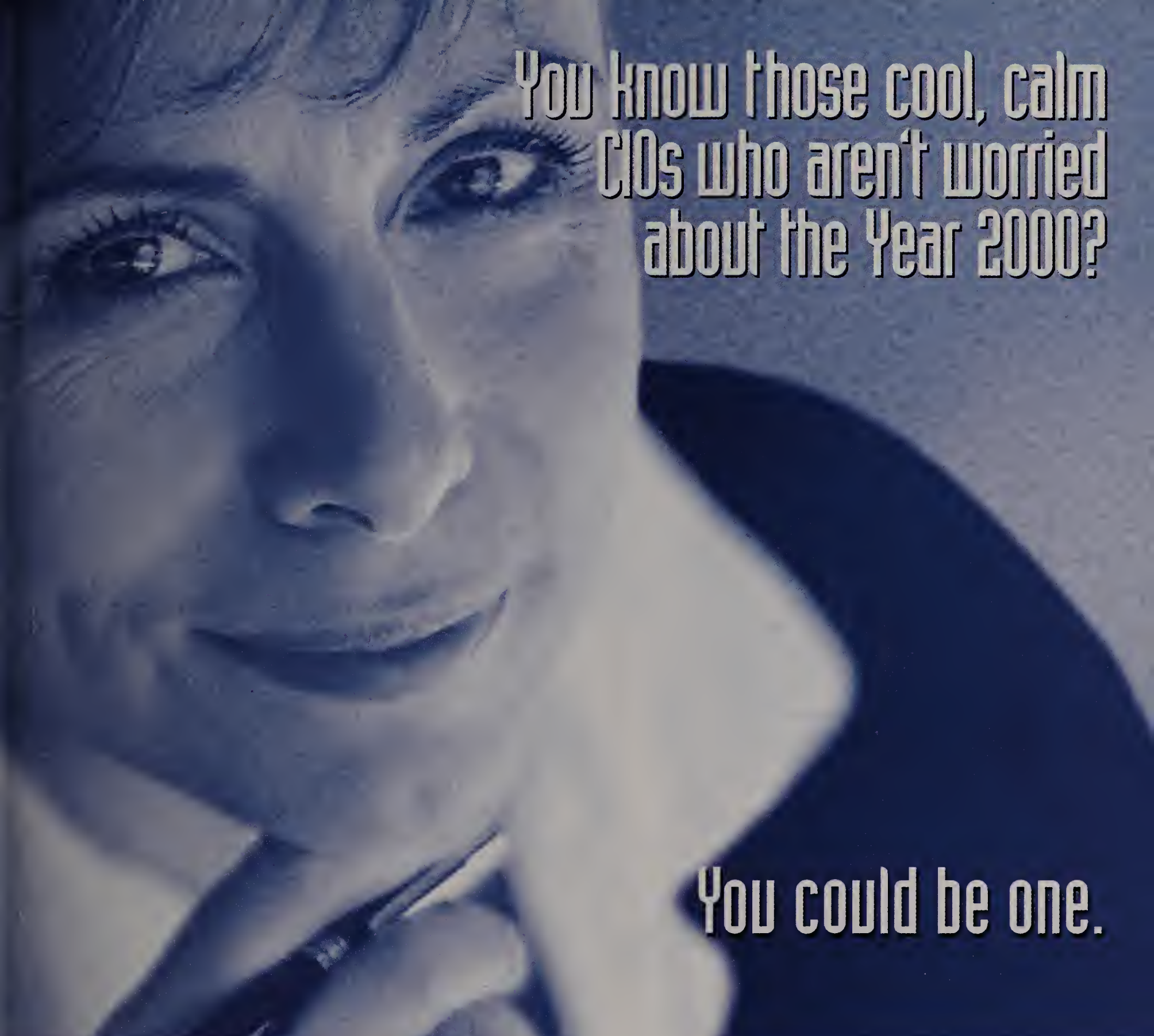
His suggestion to CIOs: Abandon the goal of a single sign-on and focus on reducing the number of user IDs for users with the most IDs. "Don't assume you'll get everybody down to one user ID," he advises, "but help cut the number to one-third for those users in the most pain."

—E.M. Cummings



passwords, each of which must be changed every 30 days. The first thing he does every morning is log on and change half a dozen passwords. Then he deals with his own forgetfulness by writing the new passwords on a sticky note and places it next to his computer.

It's a security nightmare to say the least, not to mention the way it frustrates and burdens users and security administrators alike. Now, there's a solution: "single sign-on." Vendors like IBM, Sun Microsystems, HP, CKS Group, Millennium Computer, Platinum Technology, Gradient Technologies, Memco Software and CyberSafe promise a single point of entry into the systems, making users



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Emerging Technology

case for multicasting. And three, the tools to manage multicasting are now powerful enough to give managers some confidence about keeping sessions under control. Multicast packets are built to die after a small number of hops and come with path permissions that control where they can go, both of which lower the cost of configuration errors. The latest software suite allows multicast servers to detect and resend packets not received by individual end users, a critical security feature for some applications and one that was perhaps the last advantage of the traditional unicast system.

Feeding Time

Multicasting comes in many flavors, depending on the application. There are protocols for real-time (streaming audio and video), store-and-forward (usually data), and on-demand, near-on-demand and scheduled-session multicasting.

Real-time near-on-demand multicasting might work as follows: Bob wants to watch a video available as a multicast session. He mails a subscription request to the server hosting the content, and as his request works its way up the path, each router or switch looks at the message and notes the session requested. When his request reaches the server, the flow of content begins.

If, while Bob is watching, in the next cubicle Alice sends a subscription request for the same video, her request travels only until it reaches the first network element carrying Bob's feed. At that point, the element begins copying data from the feed to Alice's client; the originating server never even knows about Alice's request. Alice is watching as Bob does, and if she happens to have missed the first few minutes of the video, she will have to wait for the tape to loop around again. Both her client and Bob's send activity alerts from time to

"Multicasting and satellites were made for each other."

—Les Kornberg

time to let the routers know that they are still watching. If they turn off their clients, the alerts cease and the router turns off the feed.

Actual users of multicasting are still rare, but they are turning up. BankBoston, for example, has been using multicasting on its Ethernet to distribute market data to more than 250 traders and other parties. John Donovan, senior manager of global capital markets systems at the Boston-based bank, points out an added advantage of the system: "When you get a failure of any kind on a unicast system, the data

LEADING

EDGE

Mobile Message Overload

LET'S FACE IT, workers of the '90s are bombarded with hundreds of messages all day long, whether by voice mail, e-mail or fax. But being on the go and not having access to even one of these means of communication could be disastrous for any employee and business.

New computer telephony technology from Concierge Inc. in El Segundo, Calif., offers a solution to much of the daily information exchange for remote users. Called **Personal Communica-**

tions Attendant (PCA), the Windows 95-

based software provides mobile users with a solution that automatically alerts them at predesignated telephones or beeper numbers when a user-specified number of e-mail, voice and/or fax messages have been received. Security is handled

by voice recognition technology and a user-specific, spoken password.

The system automatically determines the mode of incoming transmissions and receives, stores, converts (where appropriate) and forwards messages in all modes. When prompted by the user, individual messages are then read over the telephone connection and may be saved, filed, acknowledged or forwarded in fax, e-mail or voice mode by the user.

The PCA package, which includes software, user documentation, tutorials and other aids, costs \$199. For more information on PCA, contact Concierge at 888 722-6246 or check out www.pcahome.com.

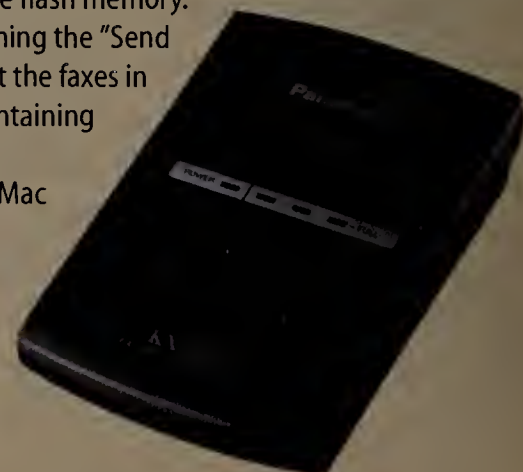


Fax On, Fax Off

SENDING FAXES VIA A PC IS AN EFFICIENT WAY FOR home and small offices to do business. But receiving late-night faxes via the PC is extremely costly, since it requires leaving the PC on all the time. New technology from the Panasonic Computer Peripheral Co. in Secaucus, N.J., is designed to handle all of those faxes that come in when you can't be at your computer.

Called **PC/Fax Store**, it retrieves faxes directly from an existing or dedicated telephone line and can store up to 40 or 80 pages, depending on the model. An LED indicator light alerts the user to the number of stored faxes in the flash memory. The user accesses the faxes by pushing the "Send to PC" button and can view or print the faxes in the flash memory at any time, maintaining fax confidentiality and security.

Both units are compatible with Mac and PC platforms running DOS or Windows. For more information on PC/Fax Store, contact Panasonic at 800 742-8086 or check out www.panasonic.com/alive.





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backs up. Then, when the failure gets fixed, all the data stores on the network start trying to resend their backlogs," he adds. "That can jam everything up again, bringing the network down a second time, creating another set of backlogs. With multicasting, these data storms are a lot less severe because the first resend operation is so much more efficient."

Promus Hotels Inc., headquartered in Memphis, Tenn., has been using software from StarBurst Communications to distribute software upgrades and data updates to member hotels through a satellite link. The time savings of sending one transmission to all the members at once (rather than resending to

Multicasting allows large numbers of sites to be served in the narrow time window offered during an orbital pass.

each member in sequence) allows the hotel to put more and more data packages on the uplink, says Les Kornberg, director of strategic architecture at Promus. Eventually these packages will include executables that would make the data interactions with the remote sites completely automatic, Kornberg predicts. He is also enthusiastic about the synergies of coupling satellites with multicasting, since satellites shrink the network topology to its simplest state: one router. "Multicasting and satellites were made for each other," he says.

Galen Muse, director of product management at DigitalXpress in St. Paul, Minn., which wholesales multicast services over satellites, expands on Kornberg's point. "We have a client with kiosks on 50 campuses across the United States," he says. "The company needs to talk to each one. If they had rented high-speed land lines [T-1s] they would have had to pay about \$1,000 per line—that's \$50,000 a month—just for bandwidth. The satellite links cost \$10,000 a month, with a one-time installation fee of \$1,500."

Multicasting allows large numbers of sites to be served in the narrow time window offered during an orbital pass. Data upgrades by satellite are a typical example of a store-and-forward application. Cisco has been using Precept's IP/TV to do real-time streaming video multicasts of company and management meetings and training events. "We reach hundreds of employees for each event who could not have been reached otherwise, either due to distance or scheduling," says Peter Solvik, CIO and vice president of information systems at Cisco. The current system covers 20 company headquarters buildings and 30 field locations, and within the next year, it will be extended to an additional 100 field WAN sites. Solvik says the system has posed no special management challenges, apart from deciding which low-bandwidth access connections in the network needed to be upgraded to accommodate the video data feed that requires a minimum of 256Kbps (although that

LEADING

EDGE

Not Your Average Monitor

DOES THE THOUGHT OF A HIGH-RESOLUTION monitor that fits into your briefcase—roughly the size and shape of an Etch-A-Sketch children's toy—sound surprising? Well, it shouldn't.

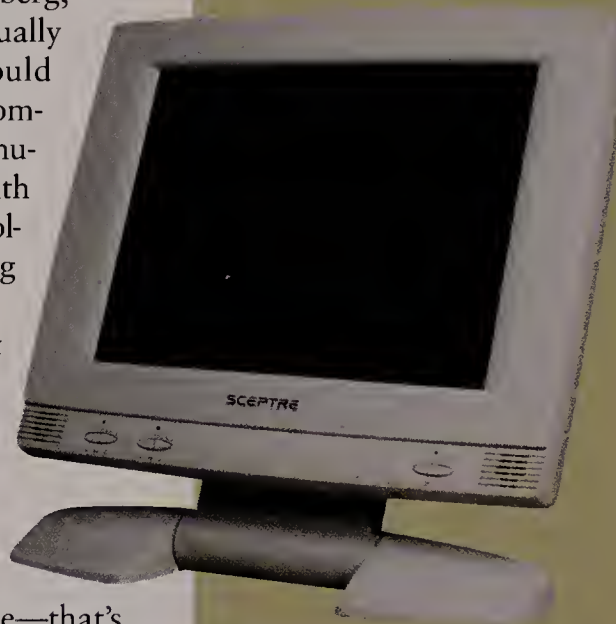
Sceptre Technologies Inc. has been designing and manufacturing flicker-free, high-resolution LCD flat panel monitor in a 12.1-inch version that weighs about two-and-a-half pounds. Recently added to its line is a 15-inch model that weighs less than eight pounds. Both LCDs from Sceptre, based in Industry, Calif., measure less than two inches thick.

The Sceptre LCDs can reduce the amount of desktop space typically required by a CRT with mounting flexibility, which includes adjustable and detachable bases and wall-mounting capabilities. Two designs also allow users to either connect

directly to the motherboard or use the plug-and-play connection to any standard VGA port.

The LCDs emit zero radiation, making them an alternative to other LCDs in environments where radiation is a major concern—such as hospitals and laboratories.

Both LCD designs are compatible with Windows 95. For more information, contact Sceptre at 800 788-2878.



is user-adjustable).

Multicasting is not the only significant change in contemporary networks, and the long-term effect of the technology will turn on how it interacts with such innovations as Fast Ethernets (including gigabit Ethernets) and new IP standards on issues like resource reservation. That interaction is, of course, unknown. Eric Andrews, assistant vice president for Vivid marketing at Newbridge Networks Inc. in Herndon, Va., says multicasting will recruit so many bandwidth-hungry services onto the networks (for video mailing lists and megabit e-mail, for example) that it will fundamentally change network architecture. **CIO**

Fred Hapgood is a Boston-based technology writer. He can be reached at hapgood@pobox.com.



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